Lincoln University
Te Whare Wānaka o Aoraki
CHRISTCHURCH•NEW ZEALAND

Lincoln University Digital Dissertation

Copyright Statement

Vulnerability of Transients and Freedom Campers in Uncontrolled Camping Grounds: Coes and Chamberlains Fords

---

A dissertation

submitted in partial fulfilment

of the requirements for the Degree of

Master of Planning

at

Lincoln University

by

Henry Robin Winchester

Lincoln University

2016

This page has been intentionally left blank

Abstract of a dissertation submitted in partial fulfilment of the requirements for the Degree of Master of Planning

Abstract

Vulnerability of Transients and Freedom Campers in Uncontrolled Camping Grounds: Coes and Chamberlains Fords

by

Henry Robin Winchester

Transient communities throughout the country are faced with the same risks as other fixed communities. However, how are these risks communicated and how vulnerable are these communities? Many families in New Zealand travel to locations their families have been visiting for generations. Within Canterbury, there are many locations where this phenonemon occurs. This research investigated Coes Ford and Chamberlains Ford, which are located along the Selwyn River in Canterbury, New Zealand. This research has three aims: first, to understand the hazards and risks that are present at both Coes Ford and Chamberlains Ford; secondly, to understand how these hazards and risks are communicated through various means; and, thirdly, based on the research, to develop a framework that improves the assessment and communication of risk to transients at Coes Ford and Chamberlains Ford and similar sites. In order to achieve these aims a review of the current hazard management literature defining risk, resilience, preparedness and vulnerability of transients, helped assist and develop the transient community vulnerability assessment framework. Along with a review of the literature, questionnaires, field observations and interviews were used to understand the hazards present and the community at each sites. The transient framework developed helped in understanding each site in regard to the makeup of each location, the hazards present and the potential impact of an adverse event. The results indicated that there were substantive differences between the Coes Ford and Chamberlains Ford communities. These were that there was a number of international visitors at both sites, with both sites having the majority of visitors from Europe. The majority of these visitors were aged between 18 and 34. The ethnic makeup of both the Coes Ford and Chamberlains Fords communities, when comparing their awareness of water quality and flooding issues, saw the Europeans the least aware of the potential of adverse events occurring, but they had the most awareness of and knew where to check if such an event was likely which could be due to the number of responders. This study concluded that the awareness of hazards in transient communities' changes and there was a need to be aware that not all communities were homogeneous, as each transient community was different and this has been reflected in the findings of this research.

Keywords: Camping, natural hazards, Coes Ford, Chamberlains Ford, transient communities, flooding, fire, water quality, extreme storms, vulnerability

Acknowledgements

I want to acknowledge my friends and family for their support and guidance in helping me throughout my studies and towards the completion of this dissertation.

I would like to express my appreciation to my supervisor, Hamish Rennie, for his exceptional guidance and enthusiasm for my research and for always providing an opportunity for me to catch up with him and discuss the topic. All his hard work has ensured I have not lost motivation and continued to work hard.

I would also like to thank Ronlyn Duncan for her support throughout my five years at Lincoln University. Both Hamish and Ronlyn helped ensure I did not lose faith in myself through the challenges that one encounters when undertaking research.

My five years of University have definitely been full of challenges and successes, and I will look back on these memories with a lot of happiness.

I'd like to extend my gratitude to Lincoln University and the Environment, Society and Design department who always made me feel as though I can make a difference. Also, a big thank you to the Lincoln University Library for the many workshops I attended to help advance the skills I gained throughout my University career.

To my friends, Beth, Thomas, Ben and Edward, I would like to thank you for pushing me when the times were tough, along with insisting that I should always proofread my work properly.

Lastly, I would like to thank my parents, Lindsay and Marie-Louise, for their support in my education over the years, not only at Lincoln University but also at school. You have given me many opportunities and I am so grateful for them. You have always supported me, whether this was in teaching me the many values you needed to be successful, such as the value of hard work, making sure I lived a balanced life style and reading through my many reports that you didn't understand, all for the moment of watching me graduate. I will never be able to say thank you enough.

Henry Robin Winchester

Abbreviations

RMA- Resource Management Act 1991

CEDM- Civil Defence Emergency Management

MCDEM-Ministry of Civil Defence Emergency Management

RPS- Regional Policy Statement

DP- District Plan

DOC- Department of Conservation

NES- National Environmental Standard

NPS- National Policy Statement

GNS- Institute of Geological and Nuclear Sciences

LIM- Land Information Memorandum

Table of Contents

List of Tables

List of Figures

List of Plates

Chapter 1

Introduction

Wherever you are in the world natural hazards are always a threat, whether it be flooding or fires. New Zealand is no exception in regard to natural hazards; as each region has different landscapes and climates resulting in different impacts. It is well known that New Zealand has an ever changing landscape. As a country, New Zealand is located in the Pacific Ocean on the boundary of two tectonic plates, resulting in tectonic activities. Christchurch, the South Island's biggest city was hit by a series of earthquakes, in 2010 and 2011, which seriously damaged the city. New Zealand not only has earthquakes to be concerned about but also the location of the country means it has constantly changing weather patterns. These weather patterns, such as southerly storms, bring cold air from the Antarctic, resulting in wet weather or powerful storms during parts of the year. To counter this during the hotter months, a warm north-west wind can cause farmers issues with drought and creates the potential for significant wildfires and algal blooms in slow moving waters. New Zealand is a country that has many climatic influences that affect everyday life.

New Zealand is a country whose people enjoy outdoor recreation, and camping is a popular activity throughout the country (Bentley, Page, & Macky, 2007, p. 791). Many families travel to locations their families have been visiting for generations. Within Canterbury, there are many locations where this occurs. The Selwyn River runs from the Southern Alps through the Selwyn District and then into Lake Ellesmere. Many campsites are located along this river, in particular, Coes Ford Reserve and Chamberlains Ford Reserve. Both locations are popular destinations for recreational activities and camping due to the local freedom camping laws. Transient communities may not have stable communities, but does that mean they should not be protected from these hazards? Although these are temporary communities, they still need the same protection as normal communities. The people who use these sites are believed to include tourists (both international and domestic), displaced families from Canterbury earthquake repairs, temporary agricultural workers, the homeless and university students. As a result of the freedom camping laws, there are international visitors at both locations who are unaware of the potential risks and hazards of these areas. They are, essentially, largely unmonitored freedom camping sites and regularly have people staying overnight for long periods of time. It is believed the numbers may reflect the new facilities that have been built at the two reserves (e.g. toilets) and, more recently, the adverse publicity and restrictions placed on freedom campers in Christchurch. These people might be especially exposed to the risk of natural hazards, such as unsafe water (e.g. due to algae blooms), fires, extreme storms and floods. The level of exposure and the vulnerability of these communities of transients needs to be better understood and the pathways

to effectively communicate risk to them explored. This may, then, increase the awareness of people staying at these locations and limit the risks associated with these areas.

The Selwyn River is a major drawcard for people visiting the Selwyn District. Coes Ford and Chamberlains Ford Reserve remain highly popular as many people stay there during both the summer and winter periods. However, these sites need to be looked after to ensure these visitors can enjoy what they offer. These reserves have management plans to oversee the running of them (Selwyn District Council, 2009). The Reserve Act 1977 aims, as stated in its purpose, to provide for the preservation and management of reserves for the benefit of the public (Reserves Act 1977.No 66). The reserve areas are mainly used for recreation and they must contain wildlife, indigenous flora or fauna according to the Act to be defined as a reserve. These reserves must also include environmental and landscape amenities or interests, and the areas may also include natural, scenic, historical, cultural, archaeological, biological, geological, scientific, educational, community or other special features of value. Both Chamberlains Ford and Coes Ford recreation reserves under the Reserves Act 1977 have a management committee who oversee the running and maintenance of the Reserves.

Camping grounds throughout the country are located near or in recreational areas, which include forests or rivers. With camping close to these natural areas comes risk. Planning for this risk is necessary for protecting people who may or may not be aware of the dangers presented by camping near them. For example flooding is a concern at both sites as the Selwyn River is a hill-fed river with its source located in the foothills of the Southern Alps. This can result in high rainfall in the upper catchment, and increased flow in the lower river where the fords are. Due to the proximity of campers many of the tents and campervans are located near the river's edge. This is where planning can play a role in protecting people by ensuring there are fail safe barriers to help prevent these hazards from impacting on people's lives.

1.1 Aims of the Research

This research was undertaken throughout 2016, with a large proportion being carried out during the winter months of June to September. Coes Ford and Chamberlains Ford both have unique environmental surroundings situated on the Canterbury Plains and are close to Lincoln University. They, therefore, were ideal for undertaking research on natural hazards and risks common to the Canterbury Region (eg. Flooding, water quaility, fires). The overall aim was to understand the vulnerability and communication of risks and hazards to users of Coes Ford and Chamberlains Ford.

The specific objectives of the research were:

1. To understand the hazards and risks that are present at both Coes Ford and Chamberlains Ford

2. To understand how these hazards and risks are communicated through various means

3. Based on the research, to develop a framework that improves the assessment and communication of risk to transients at Coes Ford and Chamberlains Ford and similar sites.

Over the course of this dissertation, these three fundamental questions will be referred to and answered.

The scope of this research only considered Coes Ford and Chamberlains Ford and did not include scientific or engineering knowledge but used planning knowledge and social science methods to help answer the aims. Therefore, this dissertation focused on how the impact hazards can be reduced and resilience can be built by planning for them.

1.2 Dissertation Structure

This dissertation first evaluates the arguments in the current literature about natural hazards, including risks, resilience, vulnerability of transients, preparedness and other important hazard management techniques and suggests a framework for assessing and communicating risk. The scope of a Masters of Planning dissertation that includes structured field collection, such as this one does not allow for detail continued review of theoretical literature, relevant legislation and policy frameworks. Consequently Chapter 2 combines both a brief review of theoretical literature directly relevant to the research aims and review of the relevant legislation context of this research. Secondly, the ways the research was undertaken will allow for similar studies to take place in other locations. Thirdly, the results of the research are set out followed by the discussion chapter that explains the results in reflection to the literature and framework. This will then be followed by a conclusion chapter summarising the key findings.

The general context of governance and natural hazard management in New Zealand is important for understanding the planning responsibilities for addressing the vulnerability of people at camp grounds

Chapter 2

Literature and Legislative Review

As noted in Chapter 1, hazard management is important in this modern age to provide resilience and reduce risks. This research rests on the assumption that understanding the current theories behind camping site safety in relation to natural hazards may improve communication and safety for visitors.

The primary factor for hazard management is knowledge of what natural hazard risks are present at particular locations. Coes Ford and Chamberlains Ford, like all other transient communities, have seasonal variations. For example, summer hazards mainly include water quality issues, compared to the winter with flooding. These hazards build up over time rather than, for example, as in winter flooding. Communicating the risks is paramount for protecting the public. All of these aspects create the toolbox for managing and protecting these areas; the same can be seen in other case studies that are reported from around the world (Nieland & Mushtaq, (2015)), (Zahari & Ariffin, (2013)). These case studies provide an insight into the role of hazard management. They can help show how hazards are managed at similar sites, with the potential for the model to be applied at Coes Ford and Chamberlains Ford.

During this review, the literature moves through a series of important factors about natural hazards and transient locations. The aim of the review is to gain an understanding of what important theories, frameworks and definitions are relevant for this study. New Zealand legislation will be investigated to understand what statutory and non-statutory legislation shapes the management of natural hazards in New Zealand. To be able to establish a framework, a review of a series of the current frameworks will be undertaken to allow for a sound framework to be created for transient locations.

This literature review is structured into three main themes. The first theme will evaluate the current theories and main themes within the literature about risk, communication of risks and hazards, resilience and hazard management. These concepts and their associated theories can then help reduce the vulnerability of transient communities. This will provide the basis for why this research has been undertaken and help in understanding the hazards for campers and in knowing how to communicate risk in a way that reduces the consequences of a hazardous event.

Secondly, the New Zealand regulatory context is described as this provides the background for understanding the current arrangements for managing campers' exposure to risk.

Lastly, two risk and hazard management frameworks will be investigated. These will help form the basis for creating the transient vulnerability framework in Chapter 3. Riskscape and GNS Science tools and frameworks will be analysed to identify key elements that might be applicable for transients in rural camping grounds.

2.1 Theories and Definitions

2.1.1 Defining Risk

Risk has been subject to many and various definitions. The literature provides an extensive knowledge base about what is risk. Risk is involved in almost every aspect of human life; financial and environmental are just two examples. Each of these aspects has literature defining what risk is for that specific area. The definition that has been chosen was due to this research investigating natural hazards, particularly evaluating the likelihood and possible outcomes of risk. This definition is, therefore, appropriate due to the link between risk and likelihood of events and their impact. Eiser et al.'s (2012) definition from the article *Risk interpretation and action: a conceptual framework for responses to natural hazards* states:

> *"Risk is a function of*
> *(a) the likelihood and*
> *(b) the value of some possible future event or events"* (Eiser, et al., (2012), p. 7).

This definition of 'risk' is very broad; therefore, defining what actual risk is, is vital. Within this article, uncertainty is shown to be an important underlying theory for risk (Eiser, et al., (2012), p. 7). How the risk is portrayed to communities is key in allowing the public to understand the processes that are operating within these communities. Eiser et al.'s focus on how risk is minimised through action is especially relevant to this research. Everything involves risk, but reducing the risk and ensuring the risks are communicated builds resilience. Consequently, risk communication and crisis communication are particularly important and relevant to hazard management (Reynolds & Seeger, 2005, p. 45). One communicates the probabilities of risk and the other communicates the risk while it is occurring. Table 1 shows these differences and the key features of both crisis and risk communication. Also within this table establishes the difference between pre event which is located on the left side of the table and during event on the right.

Table 1 Distinguishing features of risk and crisis communication, from (Reynolds & Seeger, 2005, p. 48)

Messages regarding known probabilities of negative consequences and how they may be reduced; addressing technical understandings (hazards) and cultural beliefs (outrage)	Messages regarding current state or conditions regarding a specific event; magnitude, immediacy duration and control/remediation; cause, blame, consequences
Principally persuasive, i.e., advertising and public education campaigns	Principally informative, i.e., news disseminated through media or broadcast through warning system
Frequent/routine	Infrequent/nonroutine
Sender/message centered	Receiver/situation centered
Based on what is currently known, i.e., scientific projections	Based on what is known and what is not known
Long-term (precrisis) Message preparation, i.e., campaign	Short-term (crisis) Less preparation, i.e., responsive
Technical expert, scientist	Authority figures/emergency manager, technical experts
Personal scope	Personal, community, or regional scope
Mediated; commercials, ads brochures, pamphlets	Mediated; press conferences, press releases, speeches, websites
Controlled and structured	Spontaneous and reactive

Risk communication has been defined in the literature as "exchanging of information about health risks caused by environmental, industrial or agricultural, processes, policies or products among individuals, groups and institutions" (Zahari & Ariffin, (2013), p. 882). Within the literature, the idea of top-down risk communication practices has moved from this approach towards a more consultative and inclusive process. Participatory processes allow a more citizen-based approach and allow the public to be involved with risk communication. The literature reviewed usually treats communities as reasonably stable, which raises the question of how, when people are visiting locations for short periods of time, for example, camping, are they protected from the hazards by allowing for their community involvement in the management process? The literature provides limited information on risk communication with tourists. Neverthless, this is an important part of transient locations with potentially significant proportions of people there being travellers. Disaster planning, however, plays a key part in reducing the effects of events, while the keys to reducing the effects include having clear information and instructions before and during an event (Eisenman, Cordasco, Asch, Golden, & Glik, 2007, p. S114).

Communication through clear language is paramount in ensuring risks are communicated (Reynolds & Seeger, 2005, p. 47). An important challenge is providing the target audience with information that enables them to understand the risks and potential responses being communicated. Unsuccessful communication can lead to hazards not being understood. Plain and simple language is advised to be used to ensure that these misunderstandings are avoided, and a clear message is sent to the public. If your target audience is a highly mobile or a temporary audience, understanding the languages that

they can most easily communicate in is important. Attempts at potentially universally understood signage seek to address written and oral language difficulties (Reynolds & Seeger, 2005, p. 47).

Warnings, risk messages, evacuation notifications are all methods to communicate issues surrounding a hazard, with some more important during crises periods than others (e.g. evacuation communication). Issuing warnings informs the public and can prepare them for urgent avoidance action and this can also lead to them not exposing themselves to significant risks. "Crisis communication" is an important term within hazard communication. Reynolds and Seeger explain that this term involves sending and receiving messages to prevent or lessen the adverse effects of a risk. Therefore, any form of hazard communication is crisis communication (Reynolds & Seeger, 2005, p. 46). Crisis communication can take place through a variety of methods. These methods include verbal, visual or written interactions between the management organisation and the stakeholders (Reynolds & Seeger, 2005, p. 46). Communication is vital in reducing adverse impacts and ensuring the public understand the issues, the major role of the management organisation is to ensure the public are informed about the issues. It is clear that there is a correlation between risk and crisis management. These two terms are imperative for trying to reduce, contain and limit harm to the public (Reynolds & Seeger, 2005, p. 48). The main difference is that risk communication informs the public and allows them to understand the risks that are present. Crisis communication relates to informing the public about the current state or refers to specific events.

Risk identification is another term with diverse meanings (Gaudard & Romerio, 2015). A model to determine if evacuation was needed in terms of cost-benefit analysis has been developed (Gaudard & Romerio, 2015) and helps in understanding some of the difficulties when evacuating an area. First, the protection of the people is considered the most important aspect of an evacuation by hazard managers in an event where they feel people's lives are at risk. However, along with this risk, there is also an economic element. Evacuated people may then move permanently or temporarily from a particular district, meaning they no longer contribute towards the local economy (even if they return, their contributions have been lost for a period of time). The level of importance depends on the hazards present and the extent to which avoidance or evacuation impacts on people's lives. Gaudard & Romerio conclude that it is important to understand the risks by having them defined, and this involves hazard managers developing a plan of action for dealing with significant events (Gaudard & Romerio, 2015, p. 478). Hazard managers play an important role in communities by establishing the communication and plan of action to reduce risk. It is especially important to ensure communities are ready to evacuate if needed. The options for planners in New Zealand include hazard mapping, risk assessment and the risk management standard *ISO 31000: 2009, Risk Management* includes principles, guidelines, definitions and a process for managing risk.

Pre-education is vital for establishing an understanding of what may occur at hazardous sites, especially when informing visitors, as this helps build a base of knowledge (Quinn, 2008, p. 20). This also must include, if internationals use a site, that information be communicated through the variety of languages the people use at the site (Quinn, 2008, p. 21).

Forecasting has a major role to play in hazard management. However, the uncertainty around hazards is that particular events can occur at any time and on any scale so this means it is important to understand the limitations around forecasting (Makridakis & Taleb, 2009, p. 729).

2.1.2 Resilience and Preparedness in Communities

Natural hazards are an issue globally, with many communities facing different types of hazards and on different scales. The way communities prepare for natural hazards events can significantly reduce the effects of these particular events. A key theme from the literature is the acceptance by communities of the natural hazards present (Paton & Johnston, 2001, p. 272). Communities are often faced with these natural hazards. However, communication by management groups to help communities can prepare them for such events, or otherwise, with a lack of communication, these events can have a negative impact within these communities.

A key to building resilience within communities is a shift from reactive policies to proactive ones (Cutter, et al., 2013, p. 26). Resilience is not a new term for natural hazards, as the principle developed in 1975 with the assessment of natural hazards and is applied from an all-hazards perspective to reduce the risk of hazards to help improve the response (Cutter, et al., 2013, p. 27). Community resilience has been described as: to prepare, plan for, recover from, and absorb, potentially adverse events, to reduce the overall effect of the event (Cutter, et al., 2013, p. 27). Resilience can be built through individuals, businesses and communities, with a particular emphasis on community resilience within this research.

Vulnerability and environmental hazards generally result in a potential for loss (Cutter, et al., 2013, p. 242). The social science community has defined the major factors that influence social vulnerability: "*These include: lack of access to resources (including information, knowledge, and technology); limited access to political power and representation; social capital, including social networks and connections; beliefs and customs; building stock and age; frail and physically limited individuals; and type and density of infrastructure and lifelines*" (Cutter, et al., 2013, p. 245). These major factors influence the community groups and result in either increased or decreased resilience. Social vulnerability affects different genders, ethnicities, races, socio-economic groups, age groups, locations (rural or urban), education, and special populations, such as the transient or homeless (Cutter, et al., 2013,p. 248). The literature defines each of these groups, and each group has their own vulnerability index.

Community resilience has been described as:"*The ability of a community to "bounce back" and recover using its own resources [and] requires that attention be directed to safeguarding physical integrity, ensuring economic continuity and administrative continuity*" (Paton & Johnston, 2001, p. 273). Communities need to have resilience built into them and have recovering mechanisms to be able to quickly re-establish themselves. The resources need to be available and in place to ensure that recovery can happen because small communities are often closely knit and regularly communicate within their groups. However, temporary communities in 'transient locations' (such as Coes Ford and Chamberlains Ford) are generally not familiar with other people in the community, let alone understand the apparent natural hazards (Cutter, et al., 2013,p. 249). By having a greater investment in communities, people are more likely to have a greater regard for protecting and communicating with other members staying/living at these locations. The literature generally argues that there is a greater sense of belonging with community involvement (Paton & Johnston, 2001, p. 273) (Blaikie, Cannon, Davis, & Wisner, 2014, p. 87). Individuals who have no attachment to a community may develop a level of detachment which, after natural hazards events, may trigger feelings of isolation, especially if they are international visitors (Paton & Johnston, 2001, p. 273). This results in a state of heightened vulnerability.

How people respond to the effects of hazards can change significantly depending on the situation. Paton and Johnston have evaluated two ways of increasing resilience within rural communities to reduce vulnerability. First, problem-focused coping represents a mechanism for facilitating resilience and it is different from the second strategy, emotion-focused coping strategies (Paton & Johnston, 2001, p. 273). Emotion-focused strategies tend to increase vulnerability compared to the problem-focused strategy. Problem-focused coping tends to confront the issue or problem compared to the more emotionally-focused strategy, which denies reactions and, therefore, tends to avoid the problem (Paton & Johnston, 2001, p. 273). These two types of strategies offer insight into the different ways members of communities deal with natural hazards events.

Vulnerability has many aspects, ranging from the cultural, economic and social to the environmental. Vulnerability is defined as a characteristic of individuals and groups of people who inhabit a given natural, social and economic space, within which they are differentiated, according to their varying positions in society, into more or less vulnerable individuals and groups (Lein, 2009, p. 99). Vulnerability is, therefore, measured as a component of risk, as well as hazards (Joseph, 2013, p. 186). Knowing how vulnerable communities are can have significant impacts on how what resources are made available to them (Cutter, et al., 2013, p. 245). Preparedness is vital for resilience and needs to be incorporated into resilience planning to plan for events and reduce their overall effects.

2.1.3 Early Warning Systems (EWS) and their Importance

Early warning systems or EWS have an extensive relationship with natural hazards. This has been outlined in the literature. EWS are used across the multiple hazards' arena to reduce the risk of disasters and encourage the development of planning for these disasters (Wagner & Zia, 2015, p. 190). Planning at both a national level and local level is important for risk reduction. Effective EWS can help reduce the impact of disasters, especially when EWS are integrated at multiple levels of governance (Wagner & Zia, 2015, p. 190). At a policy level, EWS needs to be integrated into policy and planning. Some hazards may take months to develop (e.g. toxicity of water quality) whereas others may arrive within hours (e.g. floods) or minutes (e.g. wildfires). Monitoring has an integral part to play in planning for natural hazards at all sites; different levels of hazards should be identified with the level of impact they potentially possess.

Local knowledge can have a significant role to play in disaster reduction. Use of local knowledge can enhance EWS as it will strengthen the system by allowing all knowledge to contribute to the greater good (Wagner & Zia, 2015, p. 191). While there have been many examples of local knowledge integrated into policy and planning, there are many tensions about how to incorporate such knowledge, and the level of devolution of power to local communities, to make decisions about how to reduce risk. A top-down governance approach is more generic, compared to the more community-centric bottom-up governance approach, which is a more community-based way of reducing risk and enables a more locally-tailored approach (Wagner & Zia, 2015, p. 191). Again, the nature of transient communities and their connections to the surrounding host community may be problematic. Wagner and Zia (2015), however, explain that enhancing multi-hazard EWS can be done by thinking in terms of a simple five-step process:

1. Preparedness
2. Response
3. Recovery
4. Rehabilitation
5. Reconstruction

(Wagner & Zia, 2015, p. 196)

These five steps, they argue, help ensure effective disaster risk reduction. Building resilience is important when establishing management plans for disaster reduction. Relevant stakeholders should be consulted to allow for a sound plan to be established, and these EWS must be made available for people and the communities attached to them (Wagner & Zia, 2015, p. 197). A clear theme within the

literature they review is that a multiple level governance approach allows for effective implementation (Wagner & Zia, 2015, p. 197). This includes engagement within the local community to help design the systems for optimal management, including opportunities for feedback. They do not address the nature of transient communities.

2.1.4 Vulnerability of Transients

People who visit a place temporarily are likely to have different knowledge and awareness of the hazards in the area depending, in part, on the length of time, the biophysical conditions, and their own vulnerability at the time and for the period when they are visiting the place. Such visitors can form transient communities – people who are temporarily present in a community in a particular place, or who move effectively as a community from place to place (Cutter, et al., 2013, p. 249). The temporary nature of their presence means that transient communities may have to rely on people informing them of exposure to the hazardous events of a particular place, rather than through internal community means of communication (e.g. word of mouth). The vulnerability of a transient community may vary depending on the nature of the different groups in the transient community. For instance, many tourists visiting a campground are camping and using motor homes and may well have their major asset bases and revenue at quite distant locations that might be unaffected by hazardous events where they are. Other campers might be homeless with no assets or alternative revenue generating means and therefore can be relatively unaffected by the event. However, the impact on this homeless but stable community might be greater than it might be on a transient community of tourists at the same location due to the relative communication with local management boards. Even among tourists, there may be a subgroup (e.g. 'freedom' campers) that, in general, stays away from normal tourist operations, such as hotels and resorts, and their vulnerability may be different from other groups of tourists. Where a campground is not directly managed (in that visitors can come and go without any form of control or fees) there may be greater difficulties in informing them of the hazards in the location where they are staying. Indeed, who has the responsibility for informing them and managing a hazardous event in which they might be at risk, may be open to debate. There is very little reported in the literature on the vulnerabiliites of people and the risks that inhabit such places where transients congregate ('transient places') and this research sets out to address this gap.

Planning for transient places in rural communities is especially important for natural hazards. Advanced planning for these socially-isolated communities can significantly help with planning for future natural hazards events. These communities lack the connections with management groups and often hesitate to ask for help (Morrow, 1999, p. 7). Rural communities include tourists and working migrants. These migrants, such as agricultural workers, are often overlooked during the management

of natural hazard events, as they often do not integrate into communities and, therefore, are overlooked by disaster planners (Morrow, 1999, p. 7). These people are highly vulnerable and may need to be included in the planning process to be kept safe.

2.1.5 Summary of the Theoretical Literature

The review of theoretical literature has identified a clear gap in the research. This revolves around risk communication to tourists in transient communities. The literature has noted that risk is a broad term; however, communication is vital for these transient locations. Clear and concise information is important when building resilience for transient communities. This then builds preparedness to reduce adverse effects. This research aims to address the gap in the knowledge about hazard communication and transient communities.

2.2 New Zealand Context - Laws and Regulations

In New Zealand the responsibility for hazard identification risk and emergency event communication, planning and management is shaped by Legislation. This section briefly reviews the development and nature of the legislation relevant to planning for hazardous events particularly affecting users of uncontrolled campgrounds.

2.2.1 Pre-Resource Management Act 1991

From the 1950's until the passing of the Resource Management Act 1991 the most relevant legislation regarding camping grounds were the Town and Country Planning Acts and the Civil Defence Act.

Formal planning in New Zealand was first introduced in the form of the Town Planning Act 1926 (Schrader, 2016). The Act was then updated in 1953 to the Town and Country Planning Act, further major amendments were made in 1977. The Act was first introduced as a reaction to health concerns, which came about from sewage and water issues. The Act was tasked with providing clean drinking water and access to sewage for the people of New Zealand. This Act required councils to prepare town plans that set out the distribution of these services (Schrader, 2016). The 1977 Town and Country Planning Act was the first act to mention natural hazards and this is outlined below:

> *"[T]he general identification of areas to be excluded from future urban development, including land of high productive capability, land subject to hazards such as flooding and earth movement, land with high aesthetic or recreational value, and land to separate and to enhance the appearance and setting of cities and towns"* (Town And Country Planning Act 1977 schedule 1, s 4 (c)).

This was the beginning of the building of good planning practices to avoid areas that may be subject to natural hazards. Power was given to local government to implement the management of natural hazards, which meant: *"The avoidance or reduction of danger, damage, or nuisance caused by-- (a) Earthquake, geothermal and volcanic activity, flooding, erosion, landslip, subsidence, silting, and wind"* (TCPA 1977 Schedule 2, s4 (a))

This provided clearer direction for managing natural hazards than in the early days of the planning legislation.

The Civil Defence Act 1959

This act was the first of its kind in New Zealand as, before this, the people of New Zealand received no support from central or local government to disasters. However, due to the growing number of disasters, such as the Hawkes Bay earthquake, in 1931, central government began to understand that such legislation was needed to give direction and guidance to the public (Ministry of Civil Defence, 1990, p. 2). In 1983, the Act was amended to define the clearer responsibilities required from local and central government. Following the 1983 amendments, the Act was criticised for being inefficient, due to the lack of funding and support from central government (Ministry of Civil Defence, 1990, p. 26). This then resulted in a more integrated approach between local and central government which, in 1999, created the Ministry of Civil Defence and Emergency Management (MCDEM) (Swarbrick, 2016). The Ministry was aimed at giving the local government direction to address natural hazards and gave them the resources in order to prepare for natural hazards events.

2.2.2 Post-Resource Management Act 1991

Since 1990 there have been substantial changes to planning approaches in relation to natural hazards. Of particular importance are the Resource Management Act 1991, Local Government Act 2002 and the Civil Defence and Emergency Act 2002.

The Resource Management Act 1991 (RMA) is New Zealand's main environmental legislation. This Act includes many tools for managing hazard risks; these include National Policy Statements (NPS) and National Environmental Standards (NES). Local authorities need to give effect to these higher level documents and to stay aware of new or proposed NPS and NES (The RMA Quality Planning Resource, 2015). This is an example of top level governance in regard to natural hazards, and underneath these are the regional and local councils who have a more direct role in managing hazards and engaging with local communities. Regional Councils prepare regional policy statements and may prepare regional plans. District councils must prepare disitirict plans governing landuse. Both regional and district councils must consider natural hazards (table 2).

Regional Councils

Regional Policy Statements (RPS) provide the direction for the management of natural and physical resources at the regional level. They coordinate the RMA policy responses to natural and physical resource issues. Environment Canterbury is the regional governing body that manages the region Coes Ford and Chamberlains Ford are within.

Regional Plans are more specific than RPS and address specific issues relevant to the local, regional councils. Regional Councils can prepare specific natural hazard regional plans and these can include objectives, policies and rules addressing natural hazards (The RMA Quality Planning Resource, 2015).

District Councils

District Councils, then, operate at the lowest level of governance. As mentioned above, every territorial authority is required to prepare a district plan; and these district plans need to give effect to the Regional Policy Statements (RPS). Even if there is no direction provided through the regional policy statement, the district plan should include risk-based objectives, policies and rules to control the effects of the use of land for the avoidance or mitigation of natural hazards (The RMA Quality Planning Resource, 2015).

Resource Management Act 1991 (RMA)

The introduction of the Resource Management Act (1991) (RMA) saw a new approach in the way the environment was managed. The RMA set out clearly defined roles in regard to natural hazards, as outlined in Table 2.

Table 2 RMA 1991 Natural Hazards from the Resource Management Act (1991)

Section 31: Functions of territorial authorities under this Act	**Paragraph b)**	**"[T]he control of any actual or potential effects of the use, development, or protection of land, including for the purpose of—**	**(i) the avoidance or mitigation of natural hazards"**		
Section 30: Functions of Regional Councils under this Act	Subsection 1: Every regional council shall have the following functions for the purpose of giving effect to this Act in its region:	(c) the control of the use of land for the purpose of—	**(iv) the avoidance or mitigation of natural hazards**	Paragraph (d) in respect of any coastal marine area in the region, the control (in conjunction with the Minister of Conservation) of—	**Paragraph (v) any actual or potential effects of the use, development, or protection of land, including the avoidance or mitigation of natural hazards and the prevention or mitigation of any adverse effects of the storage, use,**

					disposal, or transportation of hazardous substances:
Section 35: 'Duty to gather information, monitor, and keep records'	The local authority responsible in the whole or any part of the region for specifying the objectives, policies, and methods for the control of the use of land—		**(i) to avoid or mitigate natural hazards or any group of hazards**		
Section 65: 'Preparation and change of other regional plans'	Subsection 3) Without limiting the power of a regional council to prepare a regional plan at any time, a regional council shall consider the desirability of preparing a regional plan whenever any of the following circumstances or considerations arise or are likely to arise:		**Paragraph (c) any threat from natural hazards or any actual or potential adverse effects of the storage, use, disposal, or transportation of hazardous substances which may be avoided or mitigated**		
Section 229: 'Purposes of esplanade reserves and esplanade strips'	An esplanade reserve or an esplanade strip has 1 or more of the following purposes:		**(v) mitigating natural hazards**		
Schedule 4 'Information required in application for resource consent'	Subsection 7: Matters that must be addressed by assessment of environmental effects		Subsection (1) An assessment of the activity's effects on the environment must address the following matters:	**Paragraph (f) any risk to the neighbourhood, the wider community, or the environment through natural hazards or the use of hazardous substances or hazardous installations**	

Iwi Management plans and policies are non-statutory documents produced by iwi, iwi authorities, rūnanga or hapū in regard to resource management. Sections 61 and 74 of the RMA require that Regional and District plans must take into account Iwi planning documents (e.g. Iwi Management Plans) that are recognised by an iwi authority and lodged with the councils. The Maori point of view is

important for hazards management because some iwi management plans include previous hazard events based on traditional Maori knowledge. These events can provide significant insight into what has occurred previously at sites and can help the development of management plans for the future (Far North District Council, 2016, p. 1).

The Ministry for the Environment is the central government agency that has the role of administering and making National Policy Statements under the RMA 1991. The Ministry takes a risk-based approach to managing all natural hazards, which includes the likelihood and consequences of natural hazards (Ministry for the Environment, 2016). This definition also conforms to the definition used by Eiser, et al. (2012). The Ministry has also proposed a National Policy Statement (NPS) on Natural Hazards, which will ensure better central direction for local authorities.

Local Government Act 2002

The Local Government Act 2002 (LGA) is the overarching local authorities act. The purpose of this act is to provide for democratic and effective local government that recognises the diversity of New Zealand communities (Local Government Act 2002). This act makes local authorities accountable to their communities; importantly, this ensures that the local authorities provide frameworks for activities.

The LGA 2002 was the first review of local government laws since 1974, and resulted in councils having more freedom, with less prescriptive tasks and broader guidelines. Compared to the previous local government legislation of 1974, the 2002 LGA and its amendments contained more of a focus on environmental issues, including natural hazards (Gregory , 2013). Local government is also required to under the Local Government Official Information and Meetings Act 1987 (LGOIMA) issue Land Information Memorandum (LIM) on request that describe known hazards on a property.

Civil Defence and Emergency Management Act 2002 (CDEM)

The Civil Defence Emergency Management Act 2002, which replaced the Civil Defence Act 1983, is an important piece of legislation for hazards. The purpose of the act (section 3) is to -

"Improve and promote the sustainable management of hazards in a way that contributes to the social, economic, cultural and environmental wellbeing and safety of the public and also to the protection of property."

This Act is, arguably, the most important for the protection and identification of hazards and risks. Therefore, the use of it is especially important for this research.

Roles and Responsibilities in New Zealand

With many organisations working together for natural hazard management, it is difficult to understand the roles and responsibilities that each authority and organisation has in this complicated process. GNS Science (Saunders & Beban, 2012, p. 5) has set out a diagram to provide a picture of the statutory and non-statutory legislation and the roles and responsibilities of the organisations and authorities within this process. Fig. 1 sets out this process and was sourced from Saunders & Beban, (2012), p. 5.

The main pieces of legislation that govern natural hazards planning in New Zealand are set out across the top of the diagram. Central government is coloured orange; regional government is green, and district levels of governance are coloured blue. A normal hierarchy of plans occurs with RMA legislation, the overarching document. Dashed arrows have been used to highlight the relationships between the existing provisions that need strengthening.

There have been a number of articles reviewing the history of natural hazards in New Zealand. Most notably, Wendy Saunders assessed the current situation of planning provisions in New Zealand in 2014 (Saunders et al. , 2014). Her research brought together the many plans and provisions for the first time in New Zealand's history. The aim of the research was, specifically, to analyse the natural hazard provisions in all operative regional policy statements (RPS), territorial authority plans, and civil defence emergency management plans, a total of 99 at the time (Saunders et al. , 2014 p. 1). They did not report specifically addressing transient places such as uncontrolled campgrounds.

2.2.3 Issues for Managing Natural Hazards

Currently, natural hazard management in New Zealand has been outlined, as above; however, there have been issues with this process:

1. Spatial variation leads to differences in hazard risks

   Throughout the country, there are many different landscapes. For example, Auckland has many different hazards compared to Queenstown. With all natural hazards, spatial variation is very apparent. In regard to the NPS for Natural Hazards, how these variations will be accounted for in national led governance is unclear and may not be apparent until the draft NPS is released.

2. Lack of consistency

   With many Acts all striving to achieve the management of natural hazards, there is a degree of fragmentation that needs to be integrated better. For example, the RMA has a different purpose than the CDEM, as the CDEM plans aim to identify and prioritise hazards within a region, in comparison to RMA plans, which are very directive and dictate land use (Saunders, Beban, & Grace, 2014, p. 5.). The NPS may provide this greater direction from central government.

3. No natural hazard database

Currently, there is no consistent national database for natural hazards. However, a tool (Riskscape) is being developed by NIWA, which is the closest to a scientific database for natural hazards (NIWA, 2016). This program will be explained in Section 2.3.1 of this chapter.

4. Liability of territorial authorities

Currently, territorial authorities are charged with managing these hazards as they are located within the communities and understand the processes operating. This gives a more community-based approach to these natural hazards. They are situated within their own hazard landscapes and are, therefore, aware of what can occur. They may also be liable for decisions taken that fail to address their responsibilities.

The New Zealand Planning Institute (NZPI) has suggested that one of the options for solving natural hazard management and planning issues is in the use of an NPS. The national direction will then be able to be more directive as well as being more flexible to change than Section 6 of the RMA. The Ministry for the Environment has said that it would like to develop an NPS for natural hazards. The proposed timeline has a completion date during 2018, and includes guidance on managing significant risks from natural hazards.

Definitions

These four main pieces of legislation are aimed to be integrated but, as GNS Science points out, the definitions of natural hazards vary across the Acts. The Building Act is also important to mention as this Act ensures that buildings are not built on natural hazards areas. This is done by the use of PIMs (Project Information Memorandum) which are council prepared reports which contain special features of the land and regulatory requirements that may be likely to affect when building. GNS Science has broken down the definitions and provided a table to give an understanding of the direction of each of the Acts (Table 3). The Local Government Act 2002 does not have a definition for natural hazards; therefore, it has not been included in this table.

Over the three Acts, the variation between the definitions can be seen. All the definitions are worded differently, with the RMA and CDEM definitions being the most comprehensive. The Building Act definition is somewhat limited with its wording and does not include active faults, liquefaction, lateral spreading and tsunamis. This definition is surprising given the number of natural hazards related to faults recently.

Table 3 GNS Science, legislative definitions of natural hazards. (Saunders & Beban, 2012, p. 3)

Statute	Definition of natural hazard	Comment
Resource Management Act 1991	Any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.	Under Section 106, a consent authority may refuse to grant a subdivision consent, or may grant a subdivision consent with conditions, if it considers that the land, and any subsequent use of the land or any structure is or is likely to accelerate, worsen, or result in material damage to the land, other land, or structure by erosion, falling debris, subsidence, slippage, or inundation from any source. This section does not include consequences from active faults, tsunami, or geothermal activity, and is inconsistent with the definition of a natural hazard.
Building Act 2004	Erosion (including coastal erosion, bank erosion, and sheet erosion); falling debris (including soil, rock, snow, and ice); subsidence; inundation (including flooding, overland flow, storm surge, tidal effects, and ponding); and slippage.	Definition does not include active faults, liquefaction, lateral spreading, or tsunami.
CDEM Act 2002	Something that may cause, or contribute substantially to the cause of, an emergency.	Includes all natural and anthropogenic hazards.

PIMs and LIMs are unlikely to be issued for uncontrolled camp grounds as buildings can not be erected there as part of district plans. Uncontrolled campsites are not controlled by the Resource Management Act 1991, Local Government Act 2002 and the Civil Defence and Emergency Act 2002. However, each Act does have an influence on what can occur and how they are managed. District plans under the RMA set the land use for uncontrolled campsites. The Local Government Act 2002 sets the community outcomes which are wanting to be achieved, this results in either the removal of freedom camping in district such as in Christchurch City Council who recently banned freedom camping in the city. The Civil Defence and Emergency Act 2002 sets out the way these sites will be managed if an event was going to occur, this is done by implementing SOP's (Standard operating procedures). These SOP's are required by CDEM and refer to policies and procedures on how operation and safety is undertaken.

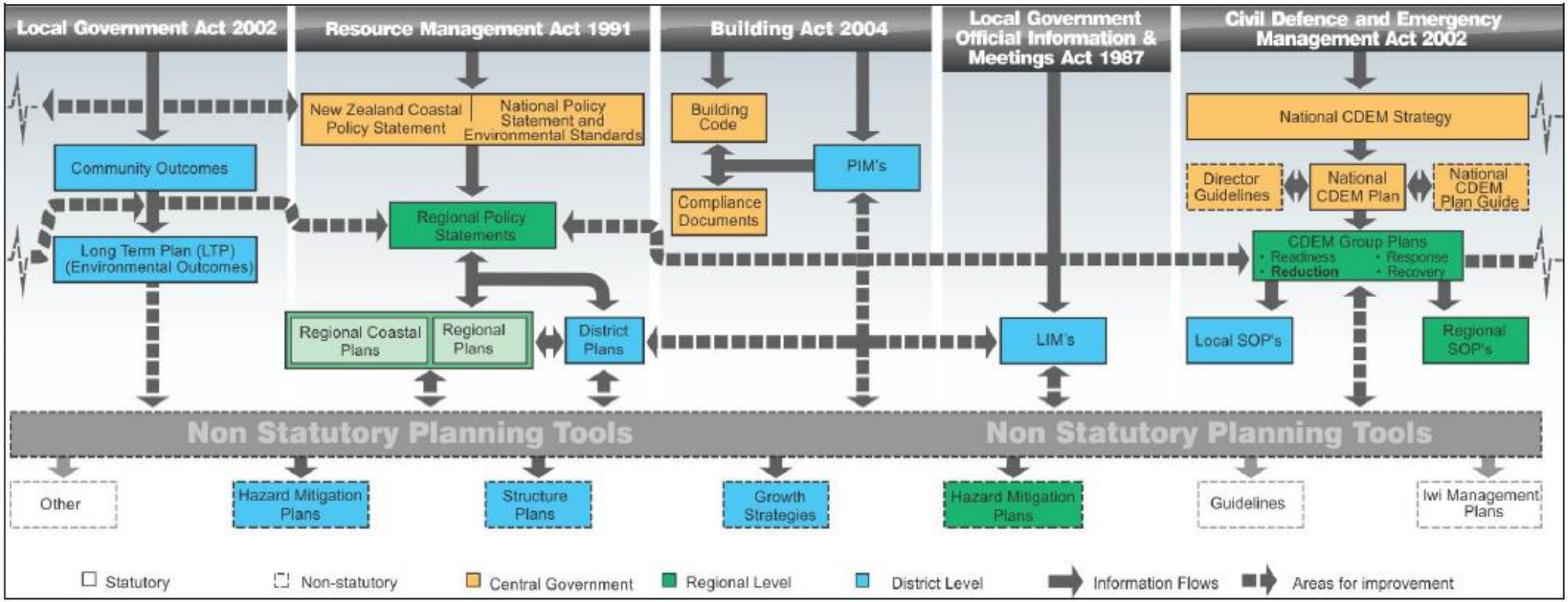


Figure 1 Legislative roles and responsibilities for hazard management in New Zealand. (Saunders & Beban, 2012, p. 6)

2.2.4 GNS Science Risk-based Planning Approach and Steps

GNS Science is a government-funded research institute. One research project they have been developing ties in well with this particular study. Their 'risk-based planning' approach aims to support risk-based land use policy and plan development in local government. (GNS Science, 2009) This is considered a new approach, where the consequences of the hazard events are focused on as opposed to the probability of their occurrence.

No one management group is responsible for all natural hazard management. A range of organisations, such as the Ministry of Civil Defence Emergency Management (MCDEM), Regional Councils, District Councils, civil defence emergency management groups and certain engineering groups, hold the responsibilities for managing natural hazards (Saunders & Beban, 2012, p. 1). According to GNS, there are four main pieces of legislation that have the primary influence on natural hazard management within New Zealand. These include the RMA 1991, the Building Act 2004, the Civil

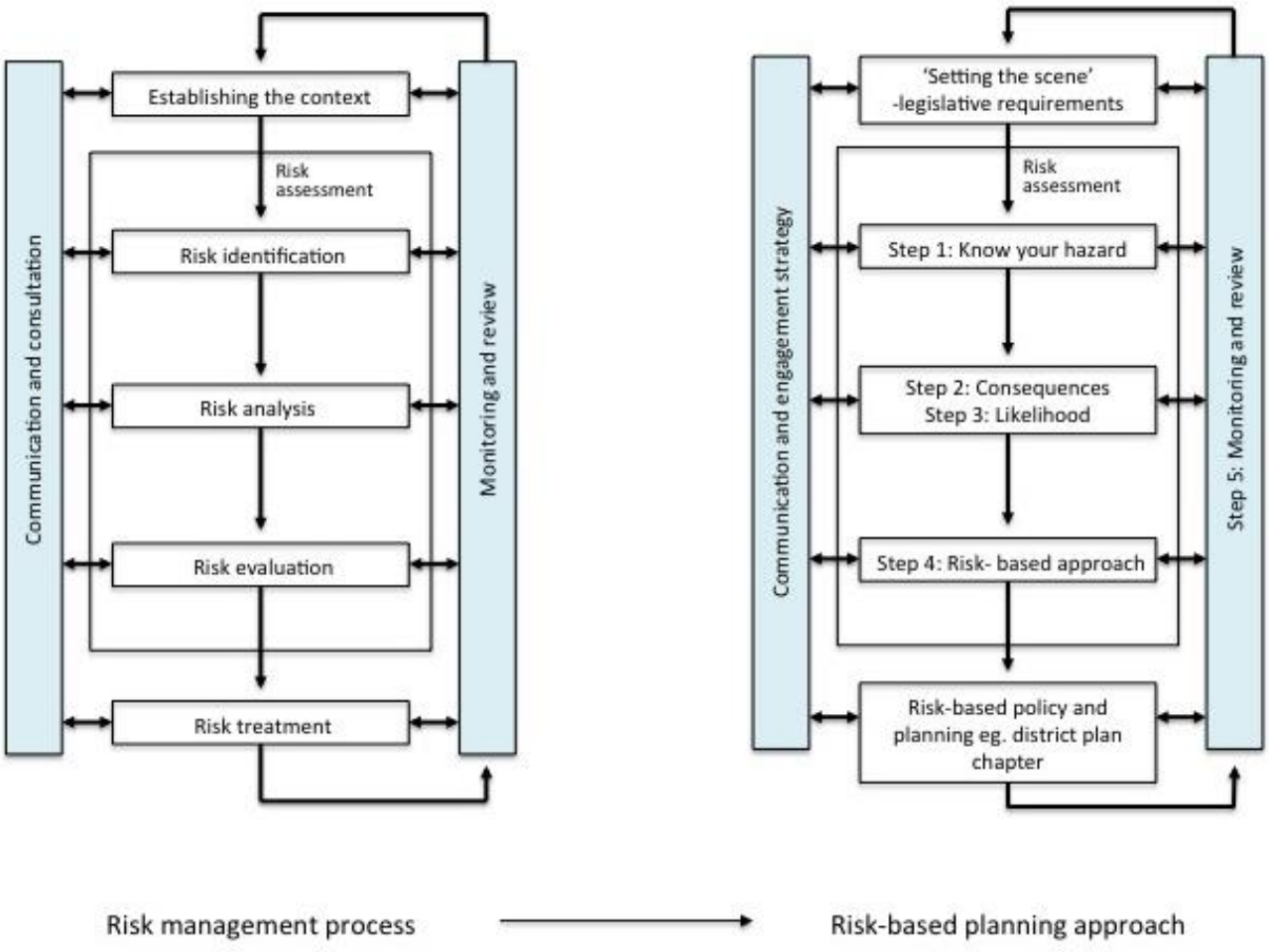


Figure 2 Risk management process and the alternative process by GNS Science (GNS Science, 2009)

Defence Emergency Act 2002 and the Local Government ACT 2002 (Saunders & Beban, 2012, p. 1). These four acts are designed to be integrated for their purposes.

GNS Science has used the Australian/New Zealand Standards (SASNZ) as a framework to develop their risk-based planning approach (Standards Australia & Standards New Zealand, 2009). Figure 2 shows a version adapted from the New Zealand Standard and GNS Science natural hazard framework. The SASNZ approach is located on the left side of Fig.2 and the GNS Science approach on the right.
From this, GNS Science has developed a planning approach with five steps (Figure 2) that is expanded (Figure 3) into a 'cookbook' approach to plan for hazard management. This aims to deliver an integrated framework that can be applied to planning practices for future or current needs. The approach is intended to be a solution of how to plan for managing natural hazards within New Zealand.

The GNS approach has been assessed and evaluated as bellow:

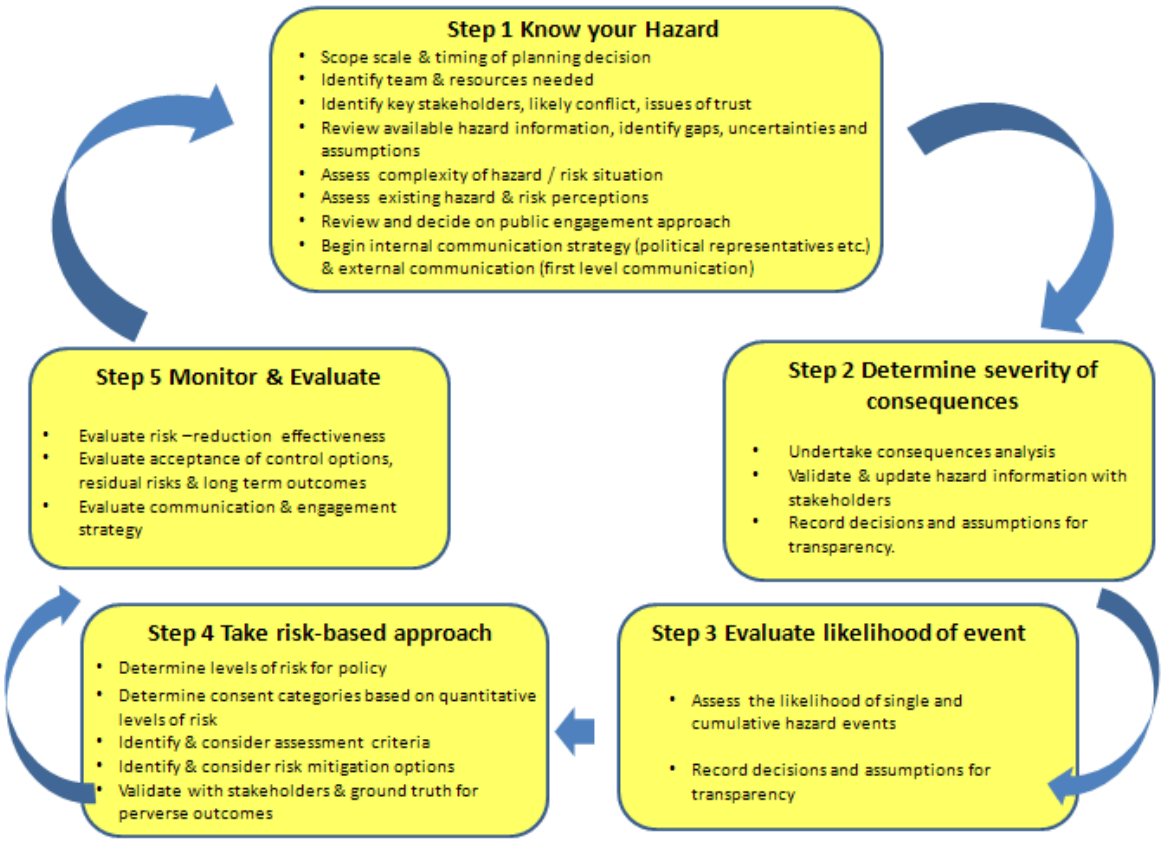


Figure 3 Risk-based planning approach and steps, (GNS Science, 2016)

1. Know your hazard

Scope scale and timing in planning decisions. Identify the key stakeholders and the likelihood of conflict. Assumptions and are uncertainties understood. What is the risk situation and complexity of the hazards? Review and decide upon a public participation approach. Begin communicating issues.

The purpose of this step is to determine the scope of the issue to be addressed and to identify the set of professionals needed. Information needs to be assembled on the hazard to be for analysed. This information can then be used for stakeholder consultation.

2. Determine severity of consequences

Undertake analysis about what the consequences may be. Validate and update the hazard information to stakeholders. Need to record all decisions and assumptions to ensure transparency in the decision-making process.

The purpose of Step 2 is to understand the possible consequences and potential impacts of the hazard. Consultation with stakeholders and specialists is a vital part.

3. Evaluate the likelihood of events

Assess the likelihood of a single or cumulative hazard event. Record all decisions.

The purpose of Step 3 is to assess the chance of any event that could result in the consequences set out in Step 2.

4. Take a risk-based approach

Determine levels of risk policy. Determine the consent categories based on quantitative levels of risk. Identify and consider the assessment criteria. Identify and consider risk mitigation options. Validate with stakeholders.

Step 4 is where the stakeholders accept the calculated risk set out in the steps above. Risk mitigation may begin to be explored, especially about large threats. Discussions with stakeholders continue to be undertaken.

5. Monitor and evaluate

Evaluate risk and the reduction in effectiveness. Evaluate acceptance of control options with stakeholders, both short term and long term. Evaluate the communication that was undertaken.

Step 5 is very important as the outcomes of this step are evaluated to understand if any further actions are required.

The set out of the approach allows for an easily-followed process. The approach requires a large range of technical skill , which should result in very good information about natural hazard assessments. However, as a result of the technical advice required, this results in a long process to develop the findings. This approach would be difficult to implement for local governments who do not have the technical advice that is readily available in institutions such as in GNS Science. However, aspects of the GNS approach are vital for community management such as stakeholder communication, evaluating the likelihood of events and monitoring. This research aims to continue to develop on these approaches assessed.

2.3 New Zealand Natural Hazard Tools

There are two recently-developed tools for addressing natural hazards in New Zealand that are directly relevant to this research; these are discussed in this section. The Sendai framework for disaster risk reduction was agreed on by the United Nations, in 2015, in Sendai, Japan. Although this framework is aimed at the United Nations for a reduction in global natural hazards impacts, parts of this framework can help towards developing a framework for transient locations. The purpose of the Sendai Framework is to guide multi-hazard management of disaster risk development at all levels as well as within and across sectors (UNISDR, 2015). This framework is expected to apply to the risk on small and large scales, frequent and infrequent, sudden and slow-onset disasters, caused by natural or manmade hazards as well as the related environmental, technological and biological hazards and risks (UNISDR, 2015). The outcomes from this framework have been set out by the United Nations to try to reduce disaster risk and loss of lives, livelihoods, health, and the economic, physical, social, cultural and environmental assets of persons, business, communities and countries (UNISDR, 2015).

The guiding principles are, therefore, directly relevant to the aims of this research. The United Nations has set out four priorities for action in this framework:

Priority 1: Understanding disaster risk

Priority 2: Strengthening disaster risk governance to manage disaster risk

Priority 3: Investing in disaster risk reduction for resilience

Priority 4: Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

Although the framework is set out for international buy-in, there are aspects of it that will be very beneficial for this particular study. In particular, the framework can be beneficial for more localised frameworks such as those addressed in my research.

2.3.1 Riskscape

Riskscape is a joint venture between two New Zealand Crown Research Institutions, GNS Science and NIWA (National Institute of Water and Atmospheric Research). Riskscape is a tool being developed for analysing potential economic and human impacts and losses from multiple natural hazards. It can be used to help understand the costs of protection measures; for example, flood defences against the losses (NIWA, 2013). Riskscape is designed to convert asset and hazard information into the likely impacts on specific locations or regions.

NIWA and GNS Science in partnership have worked towards developing this multi-hazard impact and risk assessment tool. It assesses both the direct and indirect impacts of hazards in New Zealand. This tool uses current scientific and engineering knowledge about natural hazards in New Zealand, the built environment, land use and the characteristics of communities throughout the country (NIWA, 2013). Collating this knowledge can significantly help reduce losses and impacts by evaluating what the potential effects may be during events.

This five-stage process by Riskscape has a strong aspect of understanding what assets are present at specific locations. This aspect of the approach is vital for understanding the community and will be an important aspect of the transient framework. This process is outlined in Figure 4, togther with comments on the relevenance to study risk and uncontrolled campgrounds.

Stage 1:	Stage one involves an asset module containing information about asset types and attributes that could be exposed to the natural hazards selected. Assets currently included are: roads, pipelines, waterways, buildings, agriculture, open spaces but currently no mention of transient communities, such as camping spots.
Stage 2:	A hazard module for asset location is selected and a single hazard exposure model from the module chosen. Natural hazards, which are currently covered within the hazard module; earthquakes, flooding, tsunami, windstorm. However only flooding, windstorm, are relevant for this study with further development on fire and water quality issues needed
Stage 3:	A vulnerability module, which contains models that quantify asset impacts and losses to natural hazard exposure, is selected
Stage 4:	The impact model is run for each asset. Riskscape links asset attributes and hazard exposure to vulnerability models that estimate the impact and loss sustained by the asset.
Stage 5:	Impact and loss results for individual assets are aggregated into spatial units and then presented as maps, tables or reports.

Table 4 Riskscape process broken down into a series of five stages

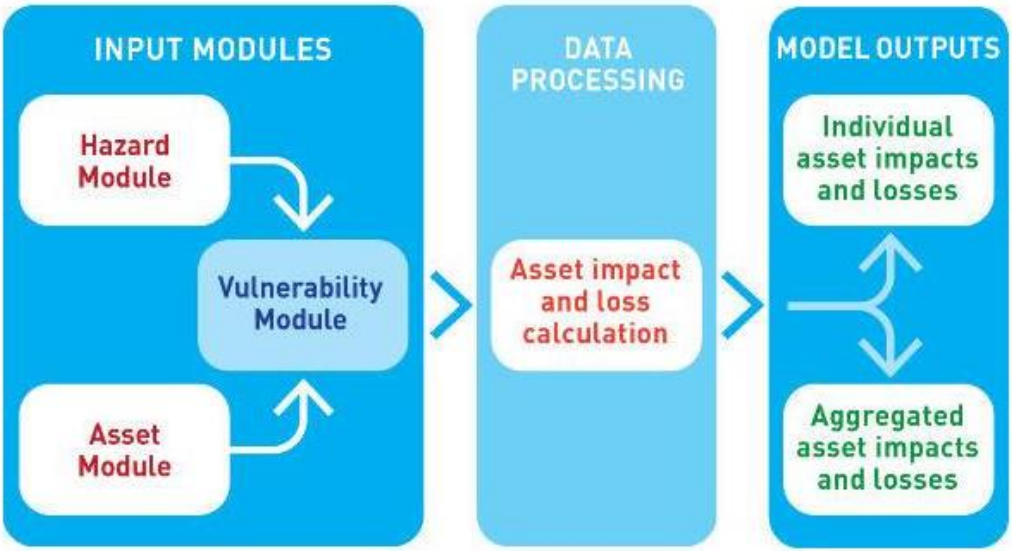


Figure 4 The Riskscape process (NIWA, GNS Science, 2015)

There is potential to use a similar model for this study and it will be outlined during Chapter 3, section 3.3.1, Formation of Transient Framework. However, much of the Riskscape framework can help inform the public in regard to natural hazards in transient locations. This research aims to further develop this process by evaluating the strengths and weakness of this framework. At this stage as considered in Table 4 it appears to lack information necessary to model uncontrolled camp grounds.

2.4 Summary of the Literature and Legislation Review

The literature has been broken down into the important sections for natural hazard management in transient locations. There were three main areas of literature examined: first, to understand these important theories and ideas; secondly, to look into the New Zealand context regarding legislation and regulations; and, finally, to look at other disaster frameworks and evaluate their important objectives to help with forming the basis for a framework relevant to transient vulnerability in uncontrolled campgrounds.

I begin by reviewing risk to understand what it is and how it may affect these transient communities. Resilience was the next theme, with resilience highlighted as being a necessary instrument for reducing risk and the impacts of these events. Temporary communities are often not included in large, natural hazard planning programmes. This theme was understood and examined to highlight the importance of understanding these communities. Following these early warning systems is important for reducing the impact of events and to highlight the importance of being prepared.

I then looked through the current and previous contexts in New Zealand. This included looking at pre- and post-Resource Management Act 1991. This highlighted the possible use of a National Policy Statement to give central direction in managing natural hazards in New Zealand. This influence includes the roles of those involved in hazard management.

In the final section two current New Zealand approaches to natural hazards were investigated: Riskscape and GNS Science. These two approaches or tools are drawn on in the formation of the Transient Vulnerability Framework in Chapter 3, section 3.3.1 that is field tested and then discussed in light of the findings and the literature reviewed in the remainder of this dissertation.

Chapter 3

Research Methods

3.1 Introduction

This dissertation aimed to investigate and understand transient communities and how natural hazards are communicated in communities with particular regard to Coes Ford and Chamberlains Ford. A set of objectives has been created:

1. To develop a model of transient vulnerability
2. To test this model applicability to transients at Coes Ford and Chamberlains Ford
3. To explore the risk communication roles and responsibilities within the region
4. To assess their effectiveness and give recommendations.

In order to address these objectives, a number of methods were used. This will be explained in this chapter and also the reasons why the sites have been chosen.

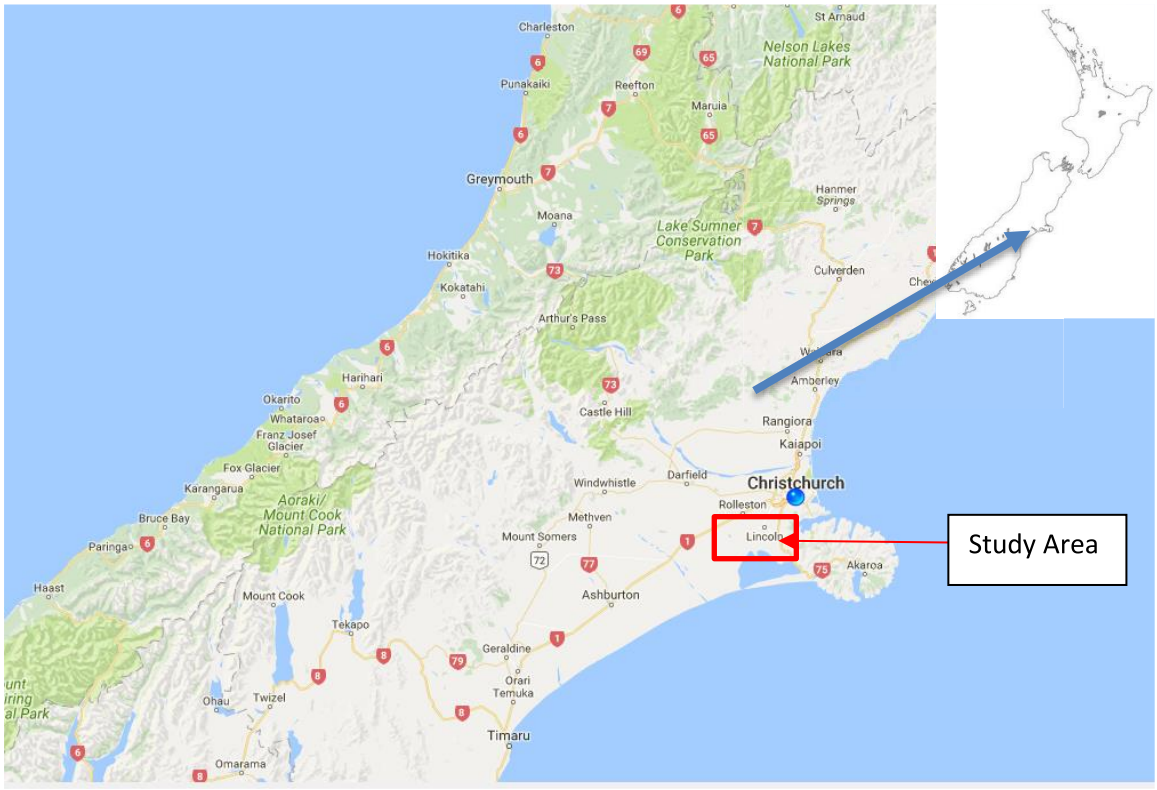


Figure 5 Study Area Location

3.2 The Research Sites

3.2.1 Coes Ford

Coes Ford and Chamberlains Ford were chosen to be the two locations of this research. The reasons for these choices are outlined below. The Selwyn River, as mentioned above, runs through the Canterbury Plains and is a popular freedom camping and recreation site. State Highway 1 is located only a short drive away; this is the major roadway in the South Island that connects all the major cities and towns. Christchurch International Airport is located around 45 minutes away, meaning many travellers hire rental cars and campervans and travel to these locations for the night before embarking on their travels. Figure 5 sets out where the study location is. Statehighway one can be seen running through the South Island.

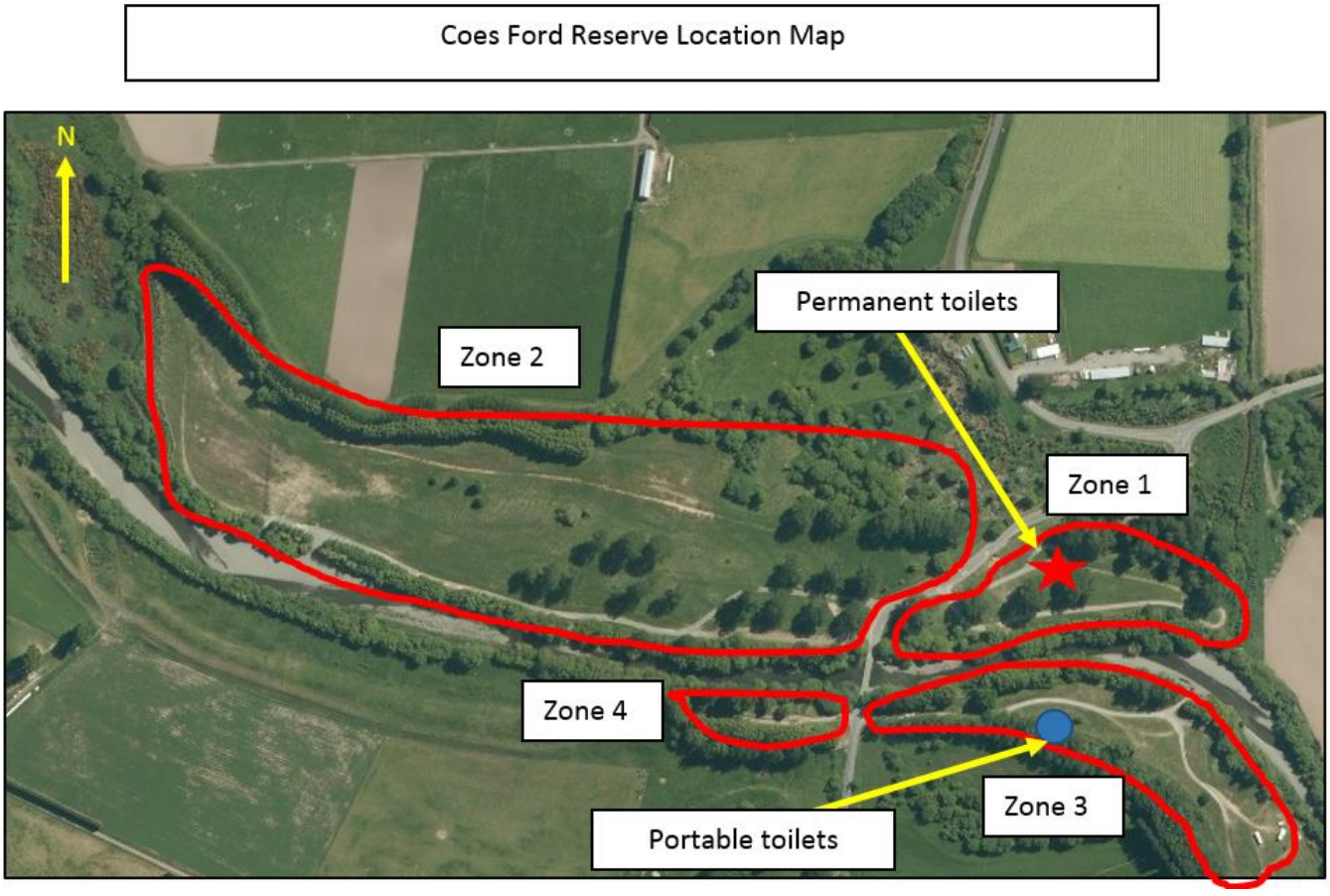


Figure 6 Coes Ford Reserve Location Map, sourced from Google Maps

Not only are these two sites located near Christchurch, but also they are far enough away from the citiy to allow for people to get away from aspects of their lives. This also includes homeless people who stay at these sites then travel back into town for work. Many generations of New Zealanders

have travelled to small campsites throughout New Zealand for recreation and to enjoy the outdoors. Coes Ford and Chamberlains Ford are popular locations for these activities.

Plates 1 and 2 show the newly-built toilet facilities (2015), which are a significant attraction to Coes Ford for freedom campers. They are located within Zone 1, which is the central area for campers to stay.

Plate 1 Coes Ford Zone 1 new Toilets

Plate 2 Coes Ford Zone 1

Plates 3 and 4 are the other two main areas, Zone 3 and Zone 2. Zone 3 is the location of private land that has people living there all year round.

Plate 4 Coes Ford zone 3

Plate 3 Coes Ford zone 2

3.2.2 Chamberlains Ford

Chamberlains Ford is located off Leeston Road in the Selwyn District. The Selwyn River runs through this location and it is a popular camping site during the summer months, due to a large swimming hole that is excavated annually at the start of each season (December) by the SDC. A new toilet facility has recently been built (2014) at Chamberlains Ford by the SDC. In order to understand how many people

use Chamberlains Ford, the site has been divided into three zones. The main two zones are on either side of Leeston Road on opposite sides of the river, and the third zone is a closed section located beside Zone 1. Chamberlains Ford is more accessible than Coes Ford as its access roads run off the main road from Leeston to Springston; this road has been classified by New Zealand Transport Agency as an arterial road (Local Government Act 2002). Compared to Lake Road, which is a Secondary Collector; it does not have as much traffic as Leeston Road (Local Government Act 2002). It is also located near the main highway State Highway 1.

Zone 1 is the main area where people are located due to its size, and is the zone that includes the built toilet facility. Zone 2 lies on the opposite side of the main road and river and is a smaller area and includes a smaller built single toilet. Zone 3 was originally connected to both Zones 1 and 2; however, it is now fenced off.

In Figure 7, we can see the three zones that are located on either side of Leeston Road. Zone 1 has the main toilet area and includes a BBQ area. Chamberlains Ford is located closer to State Highway 1 than Coes Ford; therefore, potentially, it has more people staying. Zone 2 has a smaller single permanent toilet.

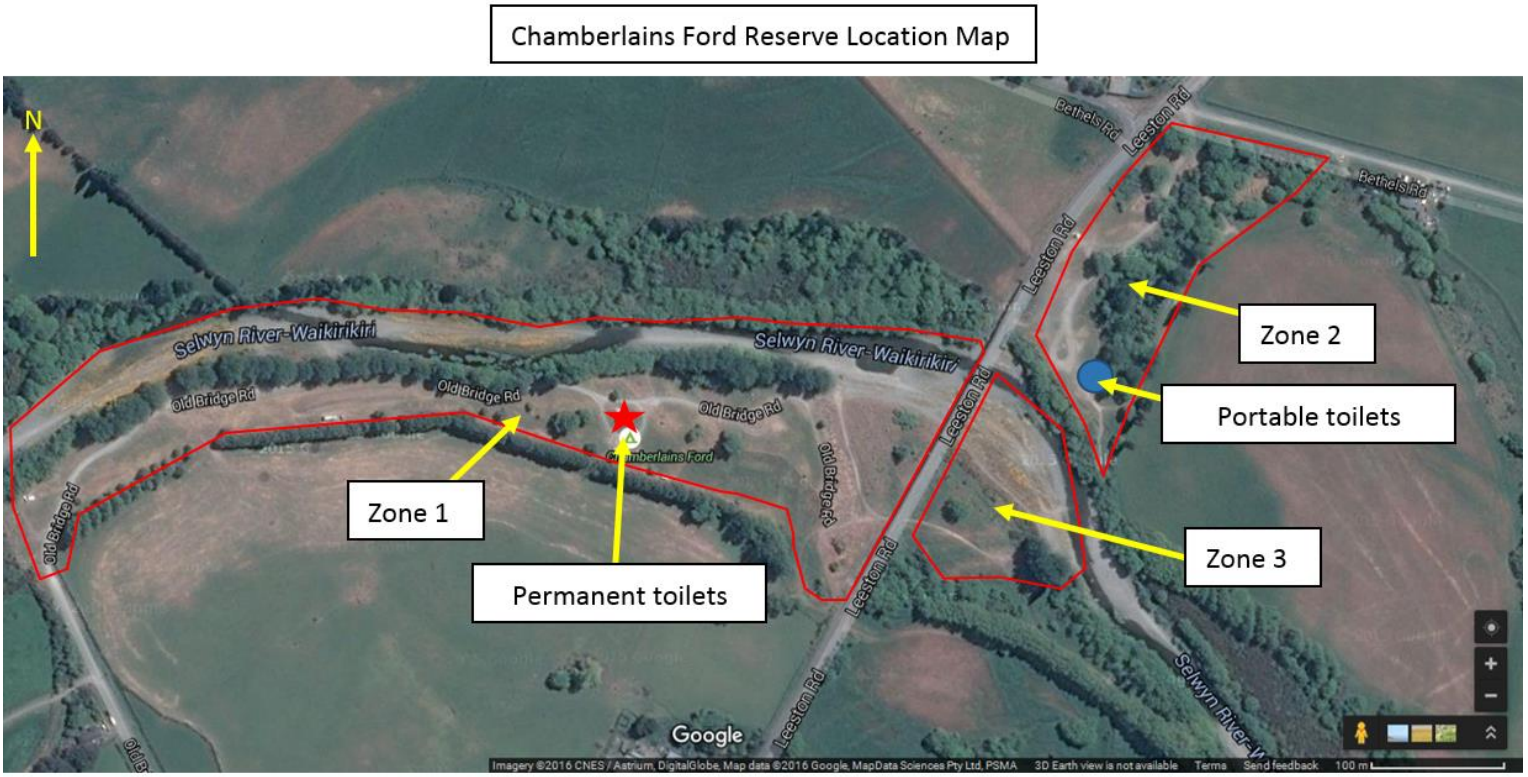


Figure 7 Chamberlains Ford Reserve Location Map, sourced from google maps

3.3 The Process

My research involves a number of different research techniques. First, I will to try to understand the background of Coes Ford and Chamberlains Ford, the two sites chosen.

Coes Ford and Chamberlains Ford are permenant reserves hosting transient communities located around 45 minutes from Christchurch Airport, the main gateway to the South Island. Currently, these two sites are managed in terms of natural hazards by a number of authorities. General maintenance is undertaken by the Selwyn District Council, the local District Council. The Selwyn District Council is also in charge of informing people at these sites if there are any potential natural hazards, such as flooding. Water quality management is undertaken by Environment Canterbury, the region's Regional Council. Fires are looked after by the volunteer fire brigade. Therefore, there is a range of local bodies who issue warnings and address these issues. My research intended to investigate their roles and responsibilities by interviewing key stakeholders, but as will be discussed later, only two stakeholders responded to requests for interviews.

Below is the framework that has been developed from the literature review.

3.3.1 Formation of the Transient Framework

Three frameworks were evaluated reviewed in Chapter 2. The three frameworks all operate at different scales but, by pulling together the different objectives that relate to transient locations, they can be combined to provide a sound framework for improving the assessment and communication of risk to transients at Coes Ford and Chamberlains Ford and similar sites.

Within the literature review, key themes and theories were evaluated and assessed. These themes included resilience, preparedness and early warning systems (EWS). These three themes are particularly important in formulating the framework. Within these transient communities, planning is important, without having the processes set in place to protect people, the protection of the people staying in these places can be at risk. These planning tools need to be established within the framework to help reduce this risk. Early warning systems help inform the community of the potential of risk and how to deal with it. From the example of Coes Ford - if there is the potential for flooding, visitors are informed and asked to leave the recreation area. The areas are then closed to protect people until the warning has been lifted. The Selwyn River is sourced from within the hill country about three hours' drive away. Flooding usually takes up to eight hours to reach Chamberlains Ford downstream and have an impact, therefore, this allows time for the ranger to evacuate people from both Coes Ford and Chamberlains Ford. This, then, leads to preparedness and resilience. Both of these

are incorporated into managing these transient sites. By having these early warning systems, resilience and preparedness are woven into the management of natural hazards. Therefore, it is important that these are incorporated into the Transient Framework to help reduce impacts of these natural hazards.

3.4 Transient Framework

Transient locations have been discussed during the previous chapters, with a specific focus on Coes Ford and Chamberlains Ford. This framework aims to not only apply to these two sites but also to other sites, with the aim of reducing risks and improve communication. The three frameworks that have been evaluated all have their strengths and weaknesses. However, by formulating the best aspects of these frameworks a strong, relevant framework will be developed.

Stage 1 Understand your Site (Risk Assessment)

Research and understand the site in terms of hazards that could affect this site. Break down the year into seasons to determine the popular timeframes and the hazards present during these. For example, summer and winter; summer may be more popular due to the swimming hole.

In all the frameworks researched, a clear theme was seen regarding the first step. Stage 1 must include an in-depth analysis of the site. This will cover what are the potential natural hazards which may affect the site. By doing this, you are then able to help begin formulating a plan in regard to planning for these events. Each event or hazard should be addressed and planned for. During this evaluation, it will be important to gain an understanding of who is present at the site during the key times. Key times zones can be used to break down the year into zones, which can easily be assessed. For example, seasons will break down the year into four sections. By understanding the season, this will help plan for the way hazards may be mitigated and reduced.

Stage 2 Assets locations

Understanding where the assets are located within the site during the seasons.

The second stage is developed after the initial introduction stage. Stage 2 builds on the knowledge already gained in Stage 1. This stage helps gain an understanding of what assets are present on site and their locations. For example, what are the main areas for people? Are they located near bush, waterways or facilities? This, then, allows for certain zones to be closed or avoided during high-risk periods, such as camping near water in winter months.

Stage 3 Risk Evaluation and possible effects

Understanding the risks by evaluating the potential risks and their likely effects.

The third stage looks into risks and the possible effects of these by using the information gathered in the two previous stages, known hazards and seasonal implications, along with where the popular spots are for people to stay. By using this information, an evaluation of the risk present can be undertaken and the possible effects on these communities.

Stage 4 Reduce risk and plan for events

Understand how these risks can be reduced and incorporate processes to communicate them.

The fourth stage is especially important for reducing risks. As mentioned above, early warning systems play a pivotal role in reducing the effect of natural hazards. These systems help build resilience and preparedness into the framework to have an overall positive effect. By having plans in place for the particular hazards that are present at a particular site, these can then be implemented easily. It is important that the persons or organisation implementing the plan understand it and know where people are located at the site. These include geological and meteorological risks present.

Stage 5 Continue to monitor to update process

Monitoring sites to update the plan if new hazards become apparent.

The final stage is one of the most important for transient communities, with many people only visiting for short periods of time and most of them being internationals. These people may not understand what can occur at their site. Therefore, the organisation or authority has a significant role in protecting these people. Many of these transient sites are located away from settlements, close to rivers and forests and this means that reliance on communication is higher than at normal camping sites. These hazards may change during seasons or quickly under the right conditions. Therefore, monitoring of the site is important to help keep up-to-date with what may affect the site. By doing this, you allow for resilience to be incorporated into the site by being prepared for what may occur.

This framework can be seen in Figure 8. The framework is a cycle and requires feedback into the system to help ensure that it is progressive and does not stagnate. This is due to the environment, which is not fixed; it is constantly changing, hence the need for feedback and monitoring. This framework is generic and can apply to other sites, not just Coes Ford and Chamberlains Ford.

Figure 8 Transient Framework

The five steps within the model all require information gathering. How the information is gathered is outlined under each headline below.

- Understand the site (Risk Assessment)

Observations, questionnaires, and interviews have been used to gather information on what risks were present at both Coes Ford and Chamberlains Ford. The information gathered included the identification of hazards present and vulnerabilities of those present.

- Understand where assets are located at the site

Observations have been used to understand where people are located while staying at either site. This enabled an understanding of where the most popular areas where when people stayed at Coes Ford and Chamberlains Ford.

- Risk evaluation and possible effects

Interviews and questionnaires have been used to understand the risks that are present and their possible effects. This enabled each hazard to be understood, including their potential effects and impacts.

- Reduce risk and plan for events

Interviews and the literature have been used to help reduce risks and plan for events. This, then, allowed for the implementation of the best ways to reduce the risks and plan for potential events

- Continue to monitor to update the process

The literature has provided key components in establishing a monitoring process which can be updated while research is being undertaken. This, then, allowed for the process to be updated as the seasons changed and new risks developed.

This framework has been tested and applied, and the findings are found in the results chapter below.

3.5 Data Gallery

In order to understand and solve the main questions, questionnaires, interviews and observational methods were used in understanding these two sites.

A questionnaire (Appendix A) with both qualitative and quantitative questions was developed to gain an understanding of where the visitors were travelling from to get to Coes Ford and Chamberlains Ford, along with how long these people intended to stay. As well as these questions, there are other questions about whether or not the visitors have knowledge of what hazards are present and if the communication is sufficient. The assets used and an expenditure to understand the potential impact of hazardous events. This will provide the necessary background to understand the users of these two sites. Members of the public staying at the two locations were approached while they were out of their vehicles. They were asked using the following script:

"Good morning/afternoon.

My name is Henry Winchester and I'm currently studying at Lincoln University. I'm working towards my Masters of Planning and I'd like you to participate in my research project by answering a series of questions in a questionnaire. Your anonymity will be protected. Information that would identify you will not be recorded. Your participation is entirely voluntary and you may stop at any stage. This will take up to 20 minutes and you may withdraw any information up until you return the questionnaire to

me. This research aims to evaluate the risks of natural hazards present here and how these are communicated to people using the area. I am also seeking information as to who uses the area to enable better targeting of information about risks. Some data on your expenditure will also help understand the potential losses to local economies if a disaster occurs. Your participation will be appreciated. If you wish to see more information I can provide you with a written research information statement and if you want time to consider whether you are willing to participate I can come back in ten minutes. Thank you for your time. Are you willing to participate now or would you like ten minutes to think about it and read the information sheet?"

If the participants accepted, the questionnaire was given to them. I then waited for the questionnaire to be filled out at a short distance away to provide privacy. This occurred over five weeks. The visit times can be seen in Table 5.

Along with the questionnaire, field observations were undertaken to gain an on-site perspective on who was present and to establish an understanding of where people were located at the sites. The observations were carried out twice a day at both sites. This process included understanding what type of vehicles were present, the size of the vehicles, where people were located, the weather conditions at the time and the size of the tents present. All these data were collected and placed in an Excel spreadsheet, which then allowed for analysis at the end of each week. The personal checklist can be seen in the appendices (Appendix D and E).

Table 5 Visiting times for Coes Ford and Chamberlains Ford

	Monday		*Tuesday*		*Wednesday*		*Thursday*		*Friday*	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Coes Ford	*8:30am-9:00am*	*3:30pm-4:00pm*	*8:30am-9:00am*	*3:30pm-4:00pm*	*8:30am-9:00am*	*3:30pm-4:00pm*	*8:30am-9:00am*	*3:30pm-4:00pm*	*8:30am-9:00am*	*3:30pm-4:00pm*
Chamberlains Ford	*9:10am-9:40am*	*4:10-4:40pm*	*9:10am-9:40am*	*4:10-4:40pm*	*9:10am-9:40am*	*4:10-4:40pm*	*9:10am-9:40am*	*4:10-4:40pm*	*9:10am-9:40am*	*4:10-4:40pm*

3.6 Field Observations

Prior to commencing my dissertation research, I spent five weeks doing daily observations of the use of Coes Ford between (18/1/2016 to 19/2/16). This was a first attempt by my supervisor of estimating the numbers and types and locations of use of Coes Ford. This research developed the interest in the dissertation topic, but could not form part of this dissertation. A separate report is being prepared for that research. The summer research did involve a walk through identifying the state of the river and key areas of algal bloom. The data from that research is referred to in places for comparative purposes in the results and discussion chapters.

3.7 Interviews with Professionals

To help build a professional point of view, interviews were intended to be undertaken with planners and other key organisations, such as the fire service. This was intended to be to understand the planning side and the professional points of view to help build a picture of how these sites are managed. Semi-structured interviews were intended to be used because they provided a connection between the formal planning side to the more informal community side. Therefore, both perspectives would be gathered.

Interviewees were contacted via email or phone to ask for permission to be interviewed. A series of questions were sent through to them if consent was gained. Even though questions were sent through, other questions raised during the interview can also taken down in note form. A time and place was then set up with a confidentiality agreement signed to ensure anonymity in the final report.

However, I intended to interview four organisations which included New Zealand Fire Service, the New Zealand Police Force, Environment Canterbury and the Chamberlains Ford and Coes Ford Management Committee. Contact was made with three organisations excluding the New Zealand Police Force. Only Environment Canterbury and New Zealand Fire Service responded. It was dissappointing that so few organisations with management responsibilities were prepared or able to respond. The lack of response desipite follow up attemps means that the reason for no response is not known. It has meant that the management side of to analysis could not be completeted.

Data were collected at both sites through a five-week period, morning and night. These data were entered into an Excel spreadsheet that was broken into days and weeks. After each week, the percentages and total were worked out. Weekly results can be seen in the appendices (Appendix H and I).

The programme, IMB SPSS Statistics 22, was used to analyse the data collection in the surveys. The questionnaire was broken down into numbers with each question coded. Therefore, the data were easily understood and entered into the programme, which then allowed for description statistical analysis. Graphs and diagrams were then created via the programme.

3.8 Use of Documents

The analysis also used some existing datasets; these are defined as data that has not been collected for this research, but produced for other purposes (Flick, 2011, p. 123). Selecting and the weighting given towards this secondary data was evaluated carefully. Secondary data can be very useful as it saves time and, in this case, my study time was a precious resource. Two questions were asked in regard to the secondary data. First, did this data fit the research being undertaken? Did it include the necessary information in these doucments to answer the questions (Flick, 2011, p. 123). Secondly, did the depth of the data fit with the level of scope in which the study was undertaken? (Flick, 2011, p. 123). Secondary information was produced with a purpose in mind, which may not correlate with this research. Therefore, consideration about who produced these documents was taken into account (Flick, 2011, p. 124), since strongly influencial pieces of information could hinder the outcomes from these documents. They did help with understanding what has happened in the past.

For this research, the existing documents were very useful for providing depth. Some of the documents used, such as newspaper articles, council plans, council reports and incident reports, were helpful due to the short timeframe available for this research.

3.9 Summary of Chapter

Chapter 3 has discussed the way this research will be undertaken. The two research sites have been looked at and the reasons why they have been selected. The process of this research has been outlined and the methods used. These include the development of a questionnaire, interviews, and field observations have provided the basis for this research.

Chapter 4

Results

4.1 Introduction

This chapter sets out the results of the field observations, questionnaires and interviews that were undertaken. The aim of this chapter is to summarise the findings obtained during the research. The key findings will be summarised with the discussion of them in the following chapter. The goal was to understand the hazards and risks present at Coes Ford and Chamberlains Ford, and to understand how these hazards and risks were communicated and also to develop a framework to improve the assessment and communication of risk in transient communities.

4.2 Field Observations

For a five-week winter period (4/07/16 to 5/08/16), field observations were undertaken at both Coes Ford and Chamberlains Ford on the Selwyn River. Data recorded were the number and size of vehicles and tents present, and where these were located on the site. Observations were also made about the state of the river at both locations, as this will benefit the framework developed in 'Understanding your Site' (Step 1).

The general weather conditions during the site visits was overcast and sunny. The final week of observations (Week 5) was the only wet week during this survey. There were school holidays during the first week of the observations.

Currently, at Coes Ford, there was only one sign located at the newly-built toilets warning visitors of the flooding risks of Coes Ford; and Chamberlains Ford only has a small sign at the entrance to Zone 1. There were currently multiple signs located at both sites, with the potential to confuse people when they arrived. Plate 5 gave the only suggestion of communication informing visitors of the flooding risks; this was located by the main toilets in Zone 1 at Coes Ford.

Plate 5 Flood warning at Coes Ford Reserve

During summer, the primary dangers result from the water quality and not flooding, but with storms occurring in the foothills, the river level can significantly increase.

Plate 6 Coes Ford Water quality information

Plate 7 Coes Ford water quality health information

Plate 6 shows the two signs that are either end of Coes Ford itself. These are the two signs that allow visitors to understand the dangers around toxic algae.

Plate 7 allows visitors to understand the dangers of swimming in the Selwyn River when toxic algae were present, with a sign located near the entrance to the main area with the toilets (Zone 1) off the Lake Road and was, therefore, only likely to be seen by people actually crossing the Ford. These signs were easily visible to anyone actually about to cross the river using the Ford/culvert. Importantly, the health notice mentioned that visitors should avoid contact with the water after a rainfall event.

The Selwyn River flows through Coes Ford Reserve; along the edges of the river are dense willows and scrubby grass, as well as along the river bed. This created a potential fire risk for the Reserve; this bush may need to be cleared, or it could create problems.

The hazards at Chamberlains Ford were communicated through a variety of signs at the gateways to each zone. In Plate 8 we can see the communication from the local authorities to help inform people of the current issues and how they are managed. Similar to Coes Ford, water quality issues plague the Reserve. As a result, the same signs at Coes Ford were used at Chamberlains Ford. These signs can be seen in Plate 8.

Plate 8 Chamberlains Ford entrance signs

Many of the waterways throughout the country have been impacted by didymo. Almost all recreational areas, such as boating areas and fishing areas, now have signs warning people about the

risks of didymo. Chamberlains Ford; although, while it wasn't a boating area, is a well-known area for its fishing. It was important to understand that this alga was easily spread throughout regions by people participating in recreation. By not cleaning or washing the equipment used, the algae were easily moved around the regions. Environment Canterbury, the Ministry for Primary Industries and the New Zealand Government were responsible for the didymo sign. This sign indicated a hazard to the ecosystem that was spread by users, rather than a hazard to the users.

Plate 9 Didymo sign and the 28-day camping sign

Plate 9 shows this didymo sign along with the maximum stay period at Chamberlains Ford of 28 days.

Hazards Identified during the Observations

During the field observation periods, there were a number of natural hazards identified. These are outlined in Table 6 and identify when hazards were likely to be present and where they could occur. The timeframe for each hazard to occur has been generally assessed. These hazards can change quickly and need constant updating.

Table 6 Hazards identified in observations

Hazards identified in observations			
Flooding	Water Quality	Extreme Storms	Fire
Present during heavy rainfall events in and along the river	Present during hot, dry conditions in the river	Present during changing weather patterns. Can occur quickly	Present all year around. Particularly when dry conditions
Can occur quickly, but warnings can be communicated	Takes time for conditions to develop	Can occur quickly, but warnings can be communicated	Can occur quickly, but warnings can be communicated as to current risk and conditions

Plate 11 Example of Cyanobacteria (Blue Green Algae

Plate 10 Example of Cyanobacteria (Blue Green Algae)

4.2.2 Winter Field Observations

4.2.2..1 Coes Ford Observations

The five-week observation period resulted in clear themes being found. Vehicles present at each site were counted at each visit. This included counting some vehicles more than once. The reason for this was because counting them only once was difficult because it was hard to recall if one vehicle was the same as one seen there the previous day. The only way to avoid this would have been to record the registration numbers and it was felt that recording registration numbers would be inappropriate,

potentially making interview data collection problematic and raising ethical issues about the rights of privacy and anonymity for the owners. It also meant that it was not possible to calculate rates of response on the basis of vehicles present compared with interviews, as the vehicle count would over-represent the total numbers of potential interviewees.

Table 7 shows the data gathered from the five-week period of observations at Coes Ford. Throughout the five-week period, the numbers of vehicles stayed relatively similar. However, there was a clear theme of 28% of the vehicles recorded being vans. This was followed by 20% for buses and 19% for cars. Over the five-week period, there were no bikes or motorbikes recorded at Coes Ford. The number of vehicles that were motorhomes was 17% and 15% were trucks. Cars and buses were seen as the most popular during the observations; however, the number of cars reduced over the observation period. Both these vehicle types were very similar in the number of times they were recorded during the observations. Therefore, it was difficult to say whether either was more popular. The number of buses stayed the same throughout the observation period. Trucks began to become more numerous over the last two weeks. The total number of vehicles stayed around the same number, with 180 per week. As the columns record the numbers present during observation, and there were two observations per day, the final two columns represent the total vehicles divided by the number (2) of visits per day. Full day-by-day and visit-by-visit data tables are available in the appendices (Appendix H and I).

Table 7 Number of vehicles during observations at Coes Ford

Number of vehicles	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Bus	35	19%	40	22%	41	22%	34	19%	34	19%	92	20.20%
Car	43	24%	47	25.4	39	21%	24	13.40%	20	10.90%	87	19.10%
Bike	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Motor Bike	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Motor Home	34	19%	33	17.80%	30	16.20%	30	16.80%	28	15.30%	78	17.10%
Van	48	26.90%	38	20.50%	50	27%	54	30.30%	68	37.10%	129	28%
Truck	18	10%	27	14.50%	25	13%	36	20%	31	16.90%	69	15%
Total	**178**		**185**		**185**		**178**		**183**		**455**	

No attempt has been made to estimate the value of the vehicles present as there was a high diversity of vehicles. However, a proxy for value may be the size of vehicle (the larger ones being potentially more valuable and able to carry more valuables, including people, than the smaller ones. Table 8 outlines the size of vehicles that were present (full data tables of each observation appear in Appendices K and L). Vehicle size was generally measured at being four metres and under, generally this included small cars and small trucks. Medium vehicles were four to five metres and included trucks, vans and large cars. The large vehicle size was five metres and over and included campervans and house busses. The percentage of each vehicle size stayed relatively consistent for all vehicle categories, with small vehicles being the highest, comprising 34% of the total. Large and medium sized vehicles were the same at close to 33% each. Throughout the observation periods, the numbers stayed very similar with no major outliers.

Table 8 Size of vehicles during field observations

Size of vehicles	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Large	59	33%	57	30.80%	61	32%	61	34.20%	61	33.3	149	32.70%
Medium	52	29%	60	32.40%	63	34%	59	33%	66	36	150	32.90%
Small	67	37%	68	36.70%	61	32%	58	32.50%	56	30.6	155	34%
Total	**178**		**185**		**185**		178		**183**		**455**	

Table 8 outlines the size of the tents, also being potentially indicative of value, and the numbers of people present at Coes Ford. Tent sizes were broken down into three groups, small tents being five square metres or two adults. Medium-sized tents were generally eight square metres or four adults. Large tents were classified as eleven square metres or six adults. The results showed that over the five-week period most of the tents were large and medium sized. Large and medium tents comprised about 43% of the total with only 13% being small. Throughout the observations, the smaller tents were not popular. However, the medium tents comprised a significant proportion in Week 5, where there were only 11 tents, but nine of them were medium-sized. There was a major drop off in tents present, with 66 recorded in the first week compared to six in the final week. This fluctuation was potentially put down to the school holidays (Saturday 9 July – Sunday 24 July) during the first week and that it rained in Week 5 of the observational period.

Table 9 Size of tents during field observations

Size of Tents	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Large	40	60%	18	40.90%	14	32%	1	9%	0	15.30%	36	42.80%
Medium	21	30%	20	45.40%	21	48%	9	81.80%	4	37.10%	37	44%
Small	6	9%	6	13.60%	8	18%	1	9%	2	16.90%	11	13%
Total	**66**		**44**		**43**		**11**		**6**		**84**	

Chamberlains Ford Observations

The five-week observation period resulted in clear themes being found. Many in this community lived in house buses, motor homes and trucks. Most of the community living at Chamberlains Ford had cars, which they used to travel away from the Ford each day. Information obtained through the questionnaire process and casual conversation while carrying out observations revealed that they were travelling to work.

Table 10 shows the number of vehicles and types of vehicles present during the observations. The overall theme from the five-week period was that the long-staying vehicles, such as motor homes (20%) and house buses (23%) were seen the most. Cars were most popular with 26%, but most of these were used by people who owned the larger motor vehicles. Bicycles were 6.8% of the total number, and motorbikes were rarely seen, with only 0.30% of the total. Camper vans were 9.5% of the total. The numbers of specific vehicles stayed around the same each week; however, bicycles were more popular towards the end of observations.

Table 10 Number of vehicles at Chamberlains Ford during field observations

Number of Vehicles	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Bus	34	20%	31	21%	32	18%	46	26%	54	31%	98	23%
Car	44	25.70%	42	27%	44	25.70%	52	29.30%	40	23.20%	111	26%
Bike	3	1.70%	7	4.60%	16	9.30%	12	6.70%	20	11.60%	29	6.80%
Motor Bike	0	0%	2	1.30%	1	0.50%	0	0%	0	0%	1	0.30%
Motor Home	35	20%	34	22.50%	39	22.80%	35	19.70%	28	16.20%	85	20%
Van	25	14%	13	8.60%	14	8.10%	15	8.40%	13	7.50%	40	9.50%
Truck	30	17%	22	14.50%	25	14.60%	17	9.60%	17	9.80%	55	13%
Total	**171**		**151**		**171**		**177**		**172**		**421**	

Table 11 shows that unlike the relatively even distribution of size of Coes Ford, there were proportionally more large and small vehicles than medium sized. Large vehicles were 37% of the total compared with 40% for the smaller vehicles. Medium sized vehicles were 21.8% of the total. Over the five-week period, there was a similar trend with no real outliers.

Table 11 Size of vehicles at Chamberlains Ford during field observations

Size of Vehicles	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Large	62	36%	50	33.10%	59	34%	69	38.90%	79	45.90%	159	37.70%
Medium	45	26%	35	23.10%	39	22%	39	22%	27	15.60%	92	21.80%
Small	64	37%	66	43.70%	73	42%	69	38.90%	66	38.30%	169	40%
Total	**171**		**151**		**171**		**177**		**172**		**421**	

Table 12 indicates the size and number of tents present at Chamberlains Ford; the majority of the tents present were medium-sized with 41%. Large tents comprised 30.7% of the total and smaller-sized tents were 27% of the total. Over the five-week period, the numbers fluctuated, with some outliers present, for example, in Week 5 there were no large tents present. In the first week there was a major disparity in tents present with 66 recorded compared to the six in the final week. This fluctuation was, potentially, because of the school holidays (Saturday 9 July – Sunday 24 July) during the first week and because it rained in the final Week 5 of the observation period. It was difficult to explain why there was an increase in Week 4 and was not mirrored at Coes Ford (table 9).

Table 12 Size of tents at Chamberlains Ford during field observations

Size of tents	Week 1		Week 2		Week 3		Week 4		Week 5		Overall average (total divided by 2)	
Large	23	41%	11	26.80%	2	4.60%	35	52.00%	0	0%	35	30.70%
Medium	23	41%	18	43.90%	25	58%	15	22.30%	14	63.60%	47	41%
Small	9	16%	12	29.20%	16	37%	17	25.30%	8	36%	31	27%
Total	**55**		**41**		**43**		**67**		**22**	228	114	

4.1 Hazard Communication at the Sites

4.1.1 Coes Ford Hazard Signs

The way hazards are communicated has become increasingly important in a global world. It is now common for people to travel the world and experience different cultures and locations when on working holidays. Coes Ford and Chamberlains are located near the main centre of Christchurch. This made it easy for travellers to stay in a location then move to the next site when working nearby. The way these hazards are communicated can be seen in Figure 9. Coes Ford had a series of signs around

Figure 9 Coes Ford Hazard Communication (*base image sourced from Google Maps*)

the Ford. The most important signs can be seen on either side of the Ford with information about flooding beside the main block of toilets. As the main access points for the river were spread along the river, it was difficult to communicate to those present about water quality issues.

4.1.2 Chamberlains Ford Hazard Signs

Chamberlains Ford had a different set up to Coes Ford, with only two main access points into the reserve. This allowed for the issues to be communicated easily when entering the zones. Water quality issues were communicated along the access points into the river bed. The main area for Chamberlains Ford is located in Zone 1, which is off to the left. Figure 10 outlines these hazard signs.

Figure 10 Chamberlains Ford Hazard Communication Map (*base image sourced from Google Maps*)

4.2 Location of People

During the observations, there were clearly defined areas in both locations that were most commonly populated. Each vehicle or tent was recorded during each visit and then, at the end of each week, they were incorporated into a map (*base image sourced from Google Maps*) of the area. Therefore, each site had a collection of data indicating where people were located when visits were made.

Coes Ford Observations

Throughout the five-week period Coes Ford showed a consistent preference for where people were loacted; Figure 11 shows this preference of the people. The newly-built (2015) toilets have had a

significant effect on where people were located, as well as the gates, which were locked during winter. The toilets were located within Zone 1, as seen in Plate 12.

Plate 12 Toilet facilities at Coes Ford

The majority of people were located in Zone 1. The other main area for the visitors was in Zone 4, which can be seen in the bottom corner of Figure 11.

Figure 11 Coes Ford Reserve location of visitors (*base image sourced from Google Maps*)

Chamberlains Ford Observations

Figure 12 shows the main areas where people were located at Chamberlains Ford. The Ford has only two main zones compared to the four at Coes Ford, the main area, Zone 1, was the most popular, with the majority of people staying along the right-hand side of the access road. The area by the toilets was also very popular for people.

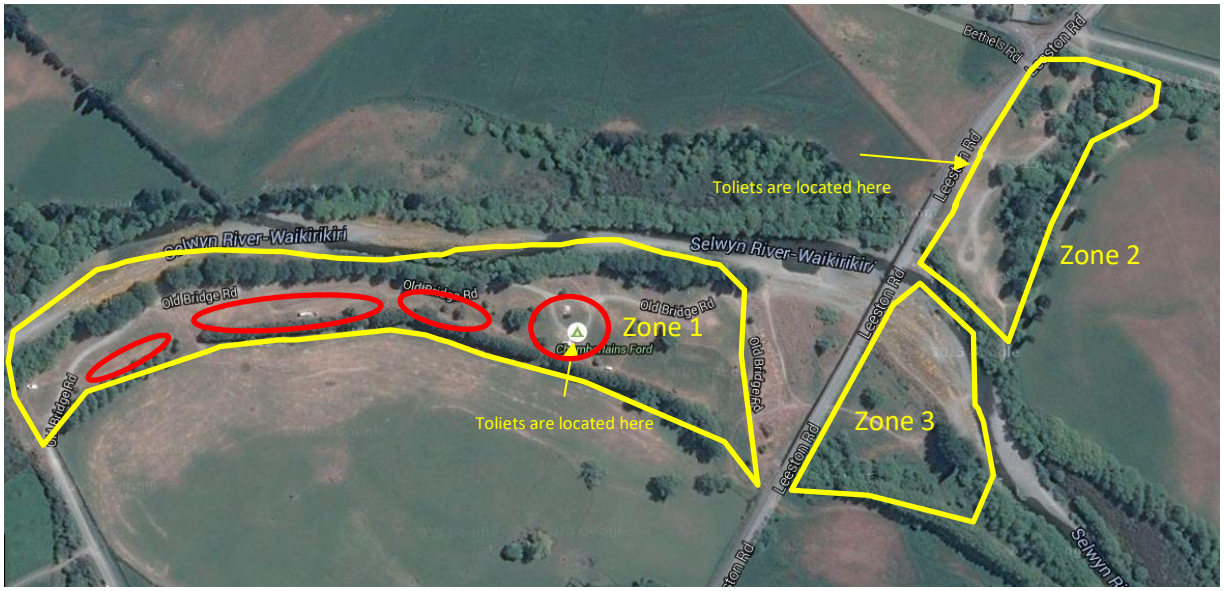


Figure 12 Chamberlains Ford Reserves showing the location of visitors (*base image sourced from Google Maps*)

4.2.1 Walk through Coes Ford and Chamberlains Ford Reserves

During the observations of both Coes Ford and Chamberlains Ford, there were many areas located along the Selwyn River where the flow rates were minimal; Plates 13 and 14 show areas of low flow, which resulted in algae build up (Plates 13 and 14). As a result, during the walk along the Selwyn River,

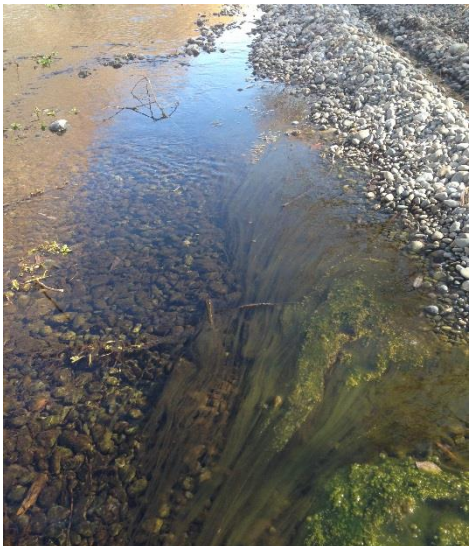


Plate 13 Coes Ford – minimal flow

Plate 14 Chamberlains Ford – minimal flow

many of these low flow areas showed a build-up of algae present. However, during the winter period, flow rates were significantly greater due to the amount of rainfall in the catchment and, consequently, these observations were made at a time when there were relatively few algae present. During the observations, black algae were very visible and were located mainly within the channel of the river. Figure 13 indicates the locations of interest during the observations at Coes Ford. The red circles correlated with particular areas that had high levels of algae in places. It was clear to see the effect of the excavator in the channel of the river on the steep sides of the river bank. As mentioned previously, the channel was cleared of vegetation to allow the water flow to be unobstructed.

It was important to understand the trade-offs when undertaking hazard management as in the case of the excavation of the channel. While the vegetation needed to be removed, there was an impact from undertaking this process but if it were not removed the risks of a hazard event were much higher.

Algal hot spots

In the diagrams below (Figures 13, 14, 15) we can see the main algae hot spots that had the possibility of impacting on visitors to the Selwyn River. The area around the Ford itself had much information provided about toxic algae, but it was not near the main access points to the river or at the gateways to the four camping areas. This can be seen in the figures below.

Figure 13 indicates the locations of concern that were along the Chamberlains Ford section of the Selwyn River. Much of the waterway was covered by thick vegetation, which included watercress, macrophytes and periphyton. During the observations it was noted that, compared to Coes Ford, the flow was significantly lower there. Vegetation control to reduce flooding risk was not undertaken at Chamberlains Ford. The red circles within Figure 13 had a high levels of black algae located on the river bed. These areas needed to be avoided for recreation. By comparing the two sites, there were more areas of concern at Coes Ford than at Chamberlains Ford. Chamberlains Ford had lower flows but had significantly more vegetation located throughout this area of the Selwyn River.

The difference between summer and winter observations was the algae build up along the river's edge. There were notable differences between the summer and winter Coes Ford diagrams. This included more vegetation during summer along with more algae present. During summer there was a higher chance of algal blooms due to the increased temperatures and lower flows. The other difference was the reduction of vegetation within the waterways between summer and winter, as in winter water can easily travel along the river channel compared to summer where there was vegetation within the waterway.

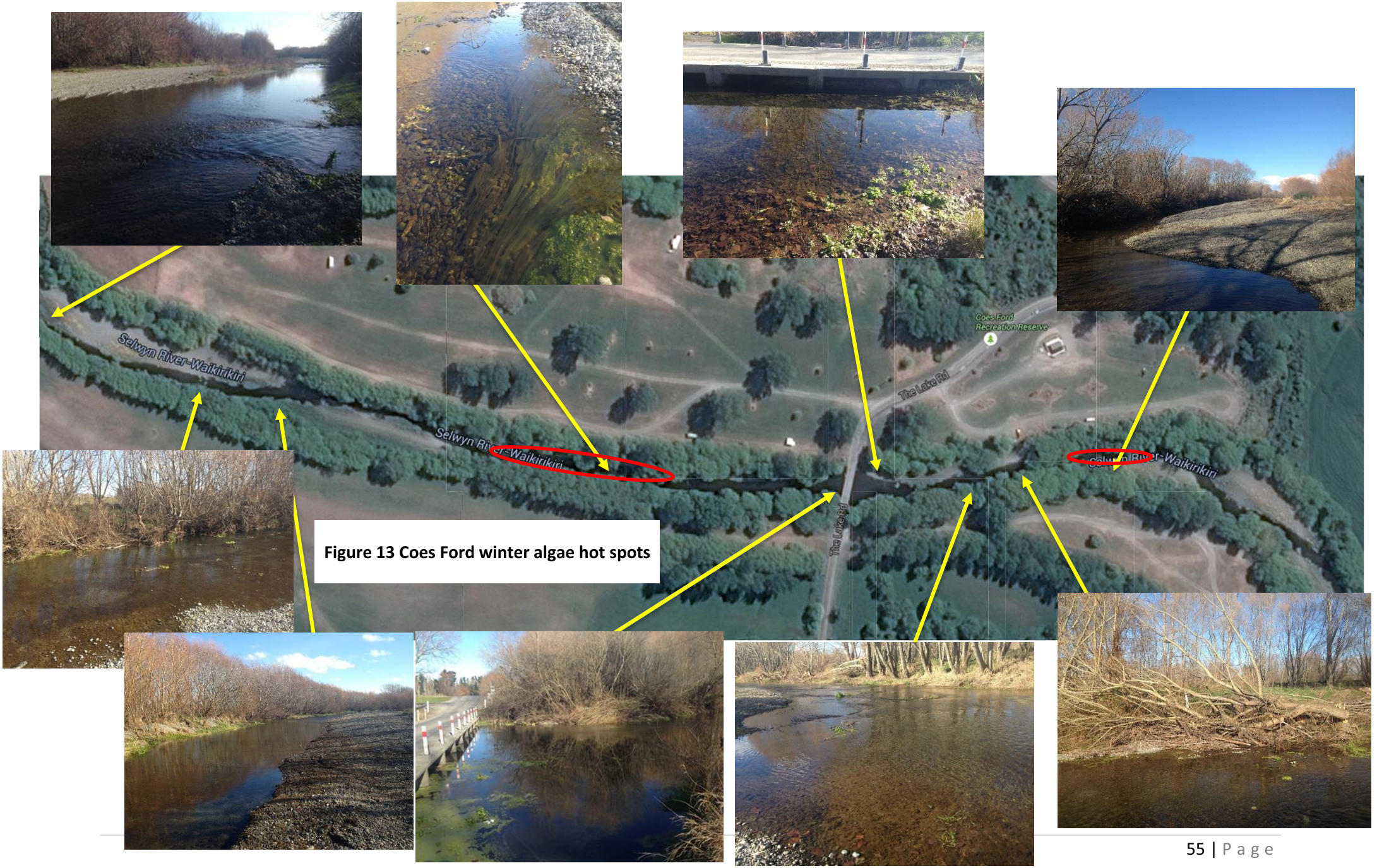


Figure 13 Coes Ford winter algae hot spots

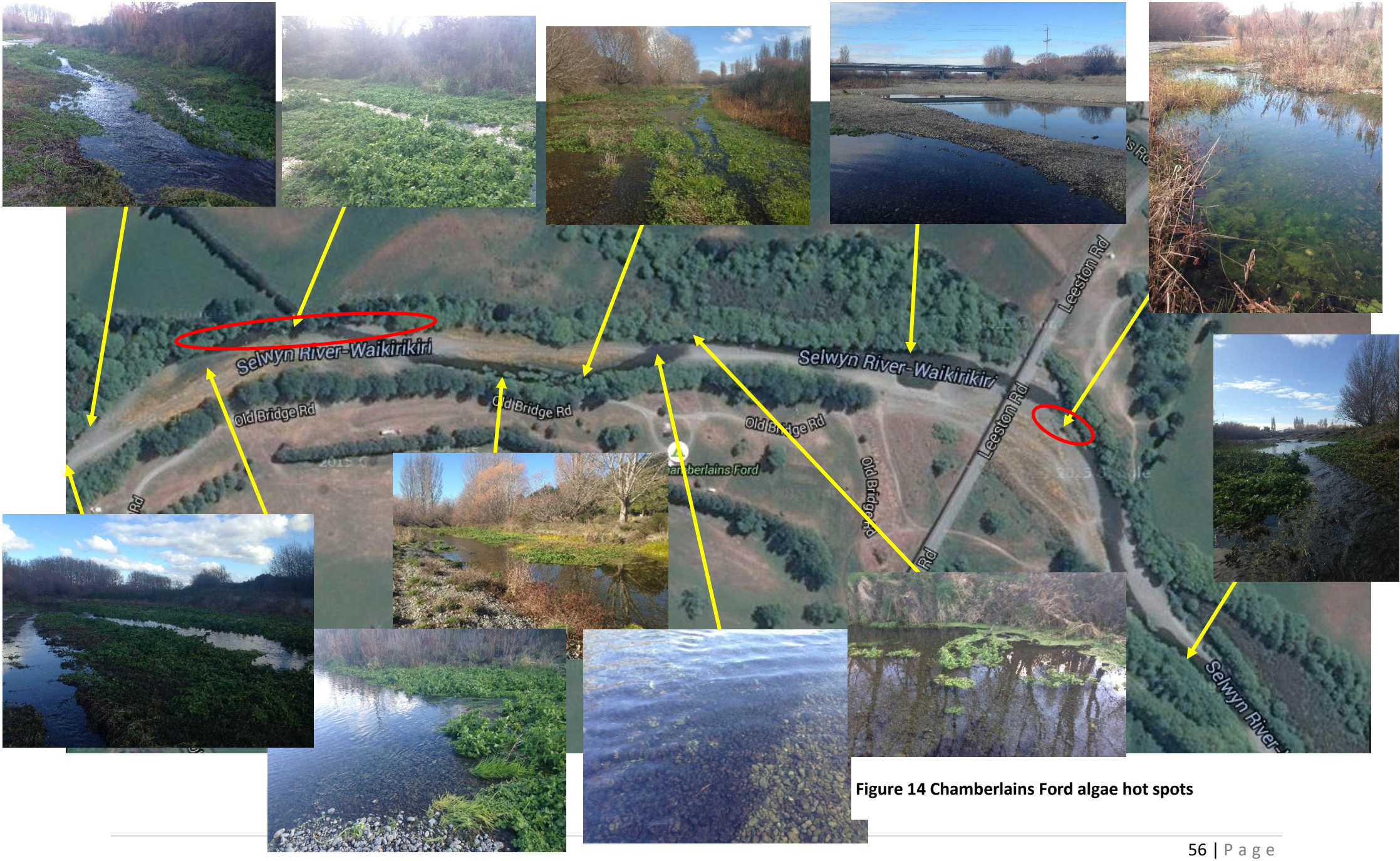
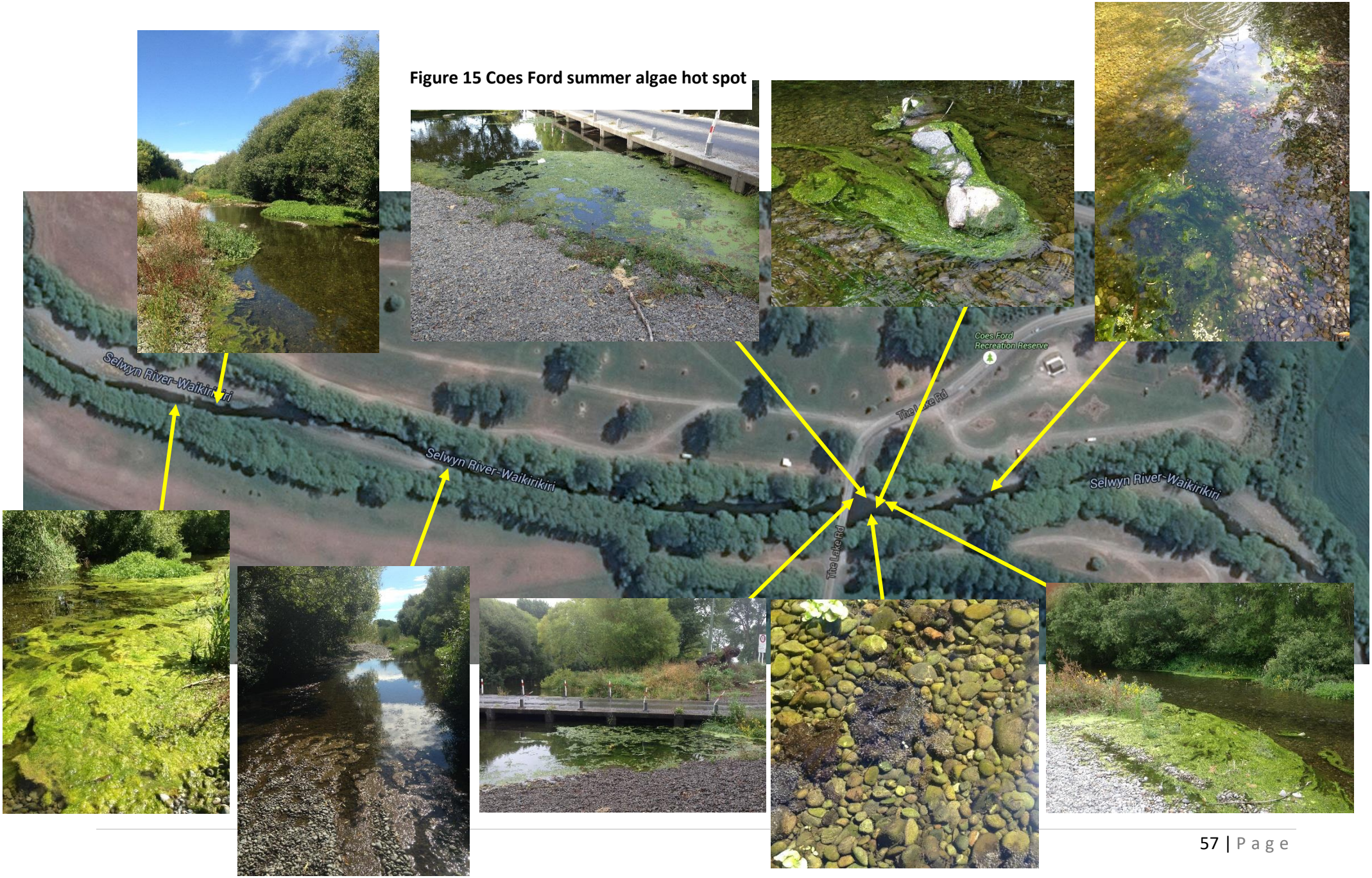


Figure 14 Chamberlains Ford algae hot spots

Figure 15 Coes Ford summer algae hot spot



4.3 Questionnaire Results

The questionnaire developed was given out to visitors at both Coes Ford and Chamberlains Ford, during the five-week observation periods. Members of the public were approached and asked if they would like to participate in the study. The script can be seen in the appendices (Appendix M). Overall, there were 95 responses, with Coes Ford having fifty-five and Chamberlains Ford forty. Ethical constraints resulted in the low numbers as most members of the public were confined to their vehicles or tents throughout the day and it had been decided that the research was not of sufficient significance to justify 'tent flap knocking.' Instead, people were only approached when they were clearly visible and outside a tent or vehicle. This meant that on rainy days it was particularly problematic to gather responses as most people stayed in their cars or tents. These questionnaire results showed the extent to which the respondents were aware of the hazards and the ways in which they may be informed about them, and the ways they currently believed they were receiving this information. The full questionnaire is attached as Appendix A. The complete set of survey responses is attached as Appendices K and L.

4.3.1 Reason for Visiting Coes Ford and Chamberlains Ford

Data collected on ethnicity showed that the majority of people by far were travelling Europeans. A smaller group of responders were from New Zealand, but the overall majority were from Europe, including: Great Brittan, Ireland, Poland, France and Germany. All international responders indicated that they were travelling.

The Chamberlains Ford questionnaire had forty responses, with fewer people occupying this Reserve than for Coes Ford. This meant, therefore, fewer people were able to participate in the survey. The results of the questionnaires did not quite align with the observations and informal conversations held during the field surveys as many in the community were long term visitors who were homeless and lived in house buses; however, the questionnaire results did not identify this. Within the results, a larger majority of New Zealanders were seen than at Coes Ford, where around fifteen people responded by saying they were New Zealanders. The most prominent ethnic group was the European group, similar to Coes Ford. There were no respondents who identified themselves as being Maori or from Asia. The 'other' category saw responses from people from Brazil, Peru and Chile.

The majority of visitors were only using Coes Ford Reserve as a stopover point rather than a destination (Figure 16). This corresponded to the number of international visitors who used the freedom camping sites to and from Christchurch.

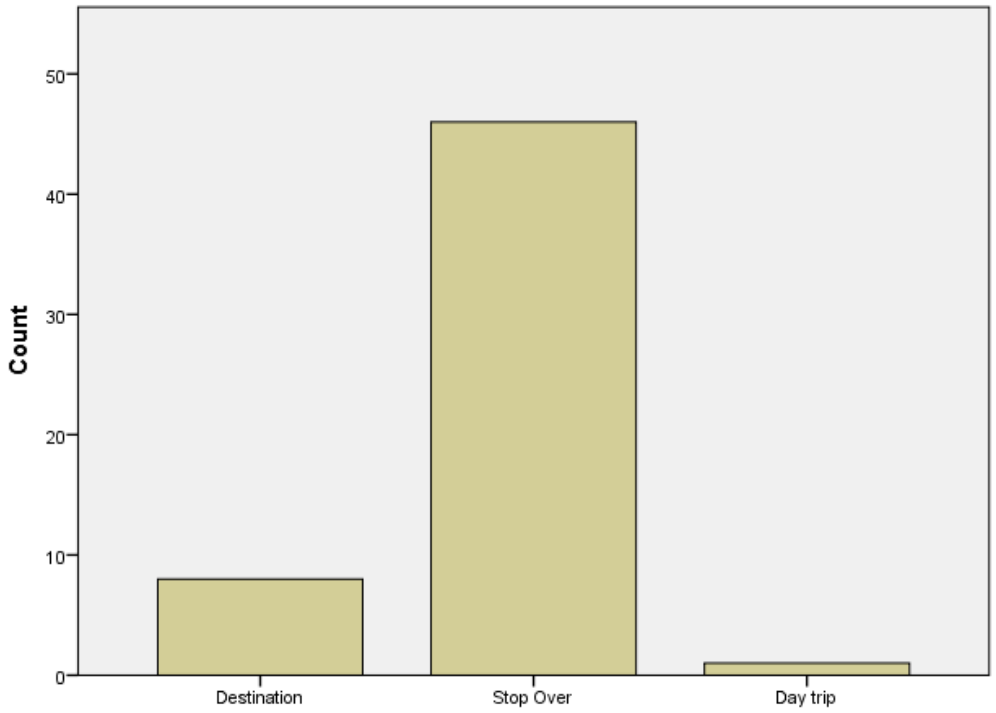


Figure 16 Reason for travelling to Coes Ford

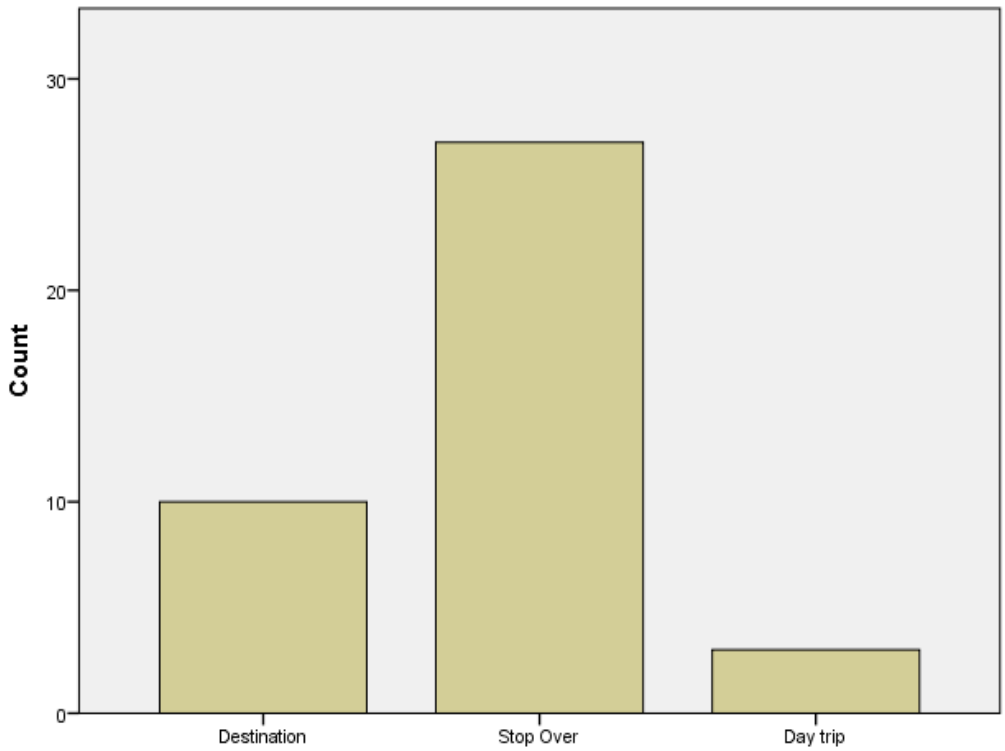


Figure 17 Reason for travelling to Chamberlains Ford

Just under half of the responders suggested that they used Coes Ford as a camping site (Figure 18). No responders used the site for fishing, but a small percentage used Coes Ford as a recreational site.

The ‘other’ category saw few responses, but the responses were the same; that they used Coes Ford as a place to stay as they were homeless.

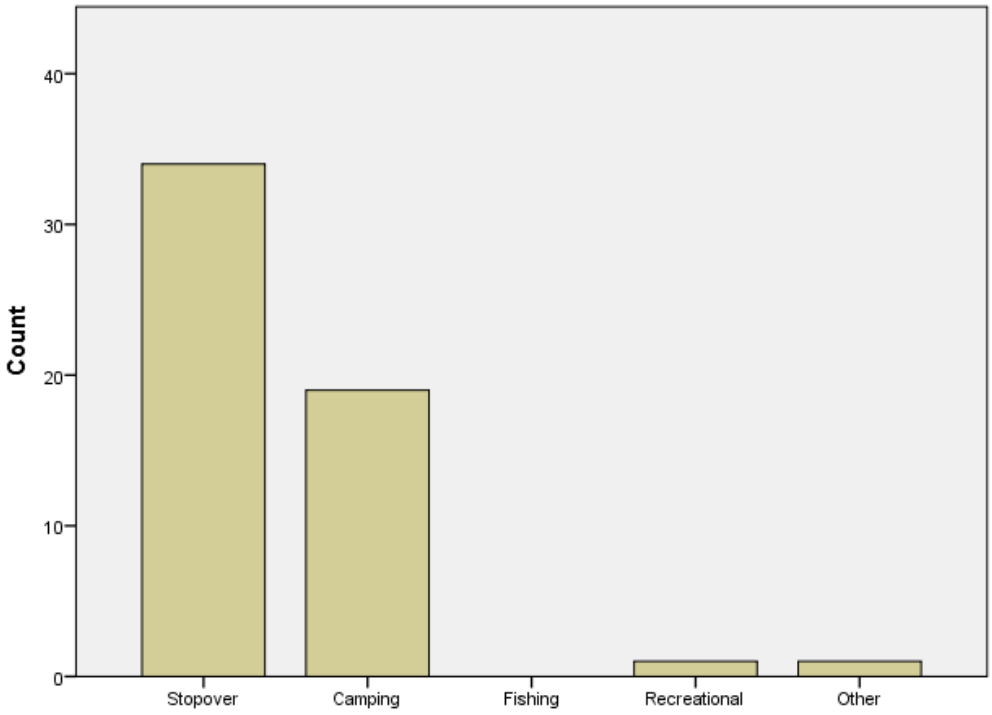


Figure 18 The purpose of visitors’ stay at Coes Ford

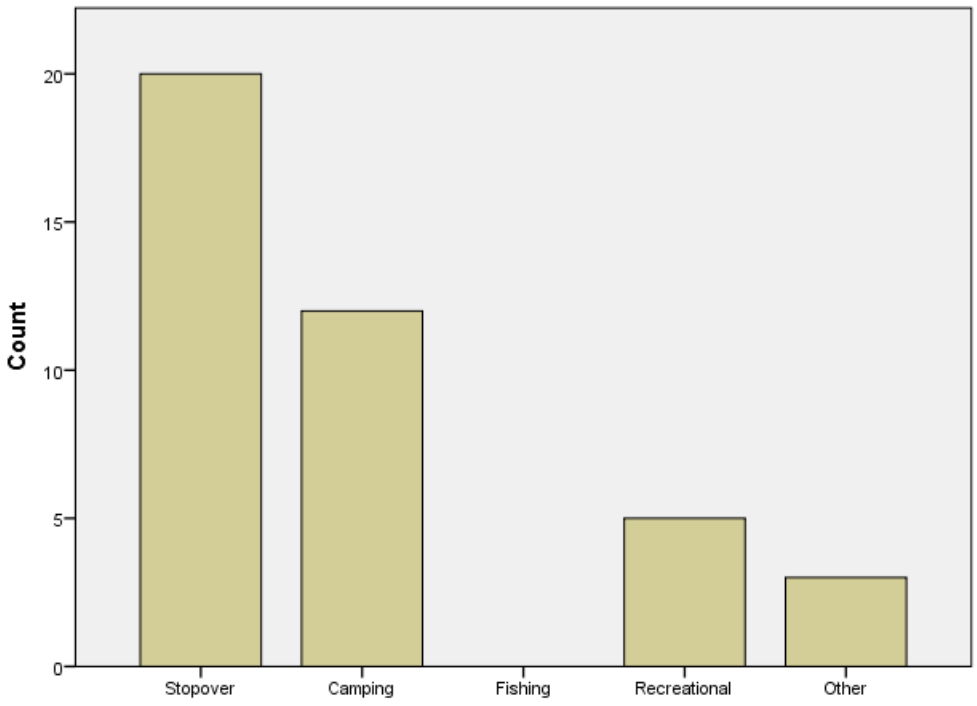


Figure 19 The purpose of visitors’ stay at Chamberlains Ford

The purpose for visitors' stay at Chamberlains Ford was stopover, with 20 responders (Figure 19). Camping had twelve responses and recreation had five responses. The 'other' category had three responses. Most of the respondents were staying for a day or overnight (Figure 19). The next three options saw limited responses, with around ten people staying for two days or more than six days.

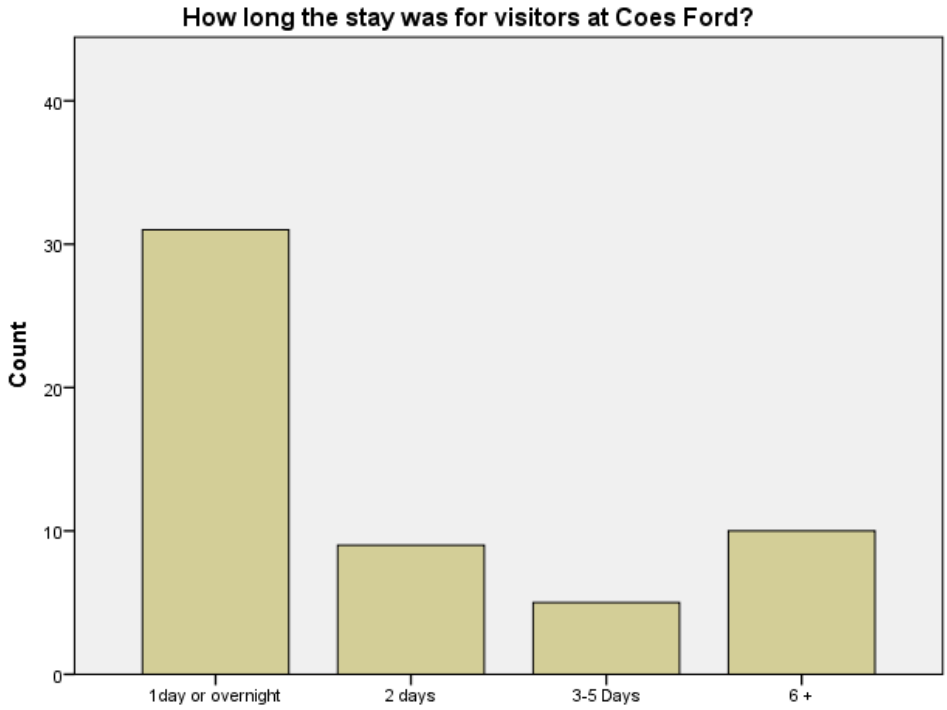


Figure 20 Visitors' length of stay at Coes Ford

The majority of responders indicated that they would only be staying for one more day after the questionnaire was completed. Figure 21 shows the length of time visitors intended to stay at Chamberlains Ford. The second major group was people staying three to five more days, with six-plus days having more than five responses. Staying two more days had only a few responses.

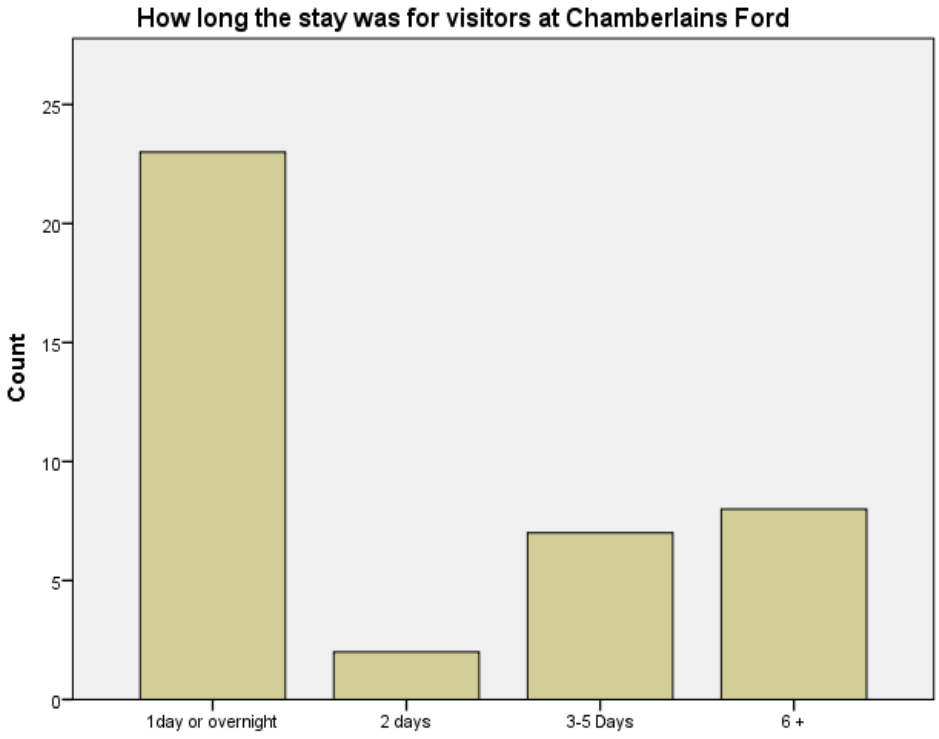


Figure 21 How long visitors had been staying at Chamberlains Ford

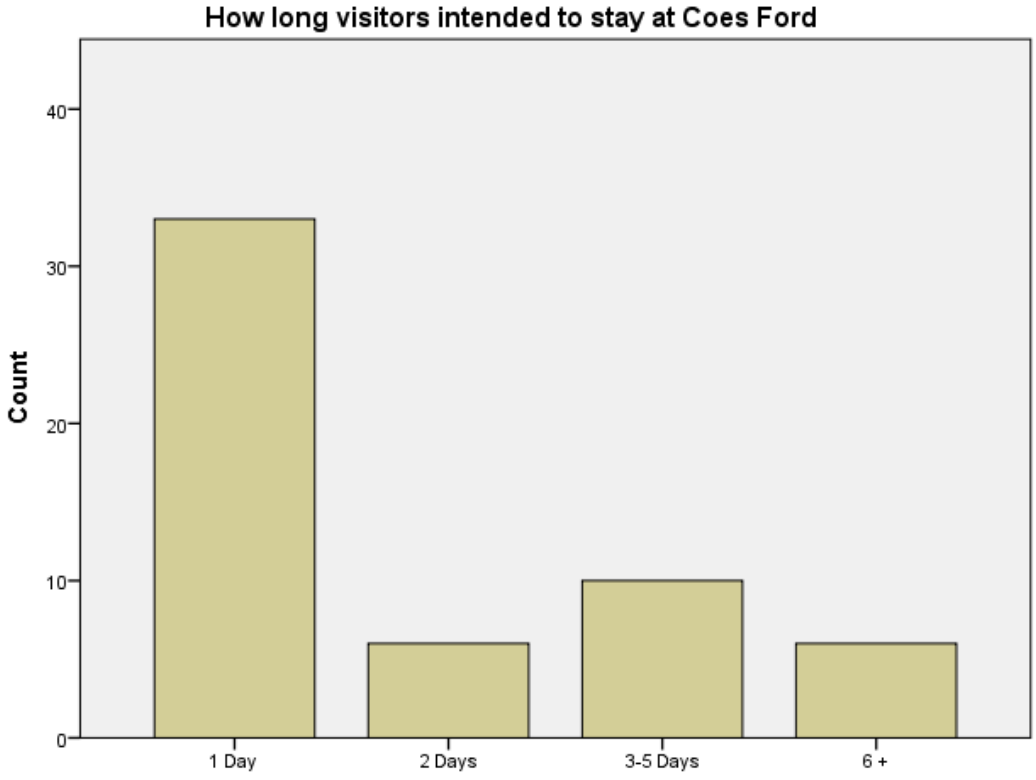


Figure 22 How long visitors intended to stay at Coes Ford

Figure 22 shows the number of nights that visitors planned on staying after the questionnaire was given to them. There were 33 responses suggesting they would leave after one more day or night. Six people said they would leave after two days; ten people would leave after three and five days and only six people stayed longer than six days at Coes Ford. The difference between how long visitors intended to stay and how long they did stay was important to differentiate. The first graph indicated how long people have been staying before doing the survey and the second graph indicated how long people intended to stay after the survey.

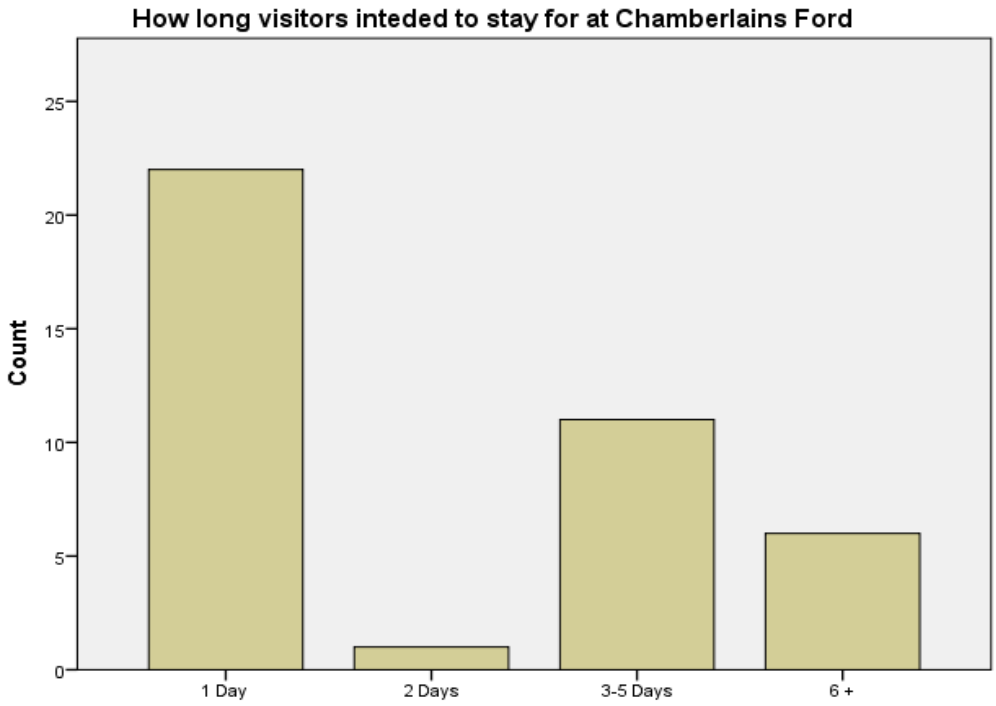


Figure 23 How long visitors intended to stay at Chamberlains Ford

The majority of responders indicated that they would only be staying for one more day after the questionnaire was completed. Figure 23 shows the length of time visitors intended to stay at Chamberlains Ford. The second major group was people staying three to five more days, with six-plus days having more than five responses. Staying two more days had only a few responses. The aim of assessing both how long visitors intended to stay and how long people had been staying was to work out the potential time that each visitor spent at each site.

4.3.2 Knowledge and Perceptions of the Awareness of Hazards

The question was asked of the public: 'Have you at any point thought about the natural hazards, such as fire, water quality, flooding, and extreme storms?' Four categories were provided to gain an understanding of the level of awareness at each site, which included: never thought of it; thought of it; aware they occur and know where to find out information; and know the probability of the occurrence and check relevant information each day. The results of this can be seen in Figure 24. The four hazards all had different responses. Flooding at Coes Ford had five responders who knew about the probability of flooding and checked it daily. There was 17 people who knew floods occurred and knew where to look, along with 16 people who had thought flooding could happen at Coes Ford. However, 16 people also replied that they had never thought that flooding could affect Coes Ford.

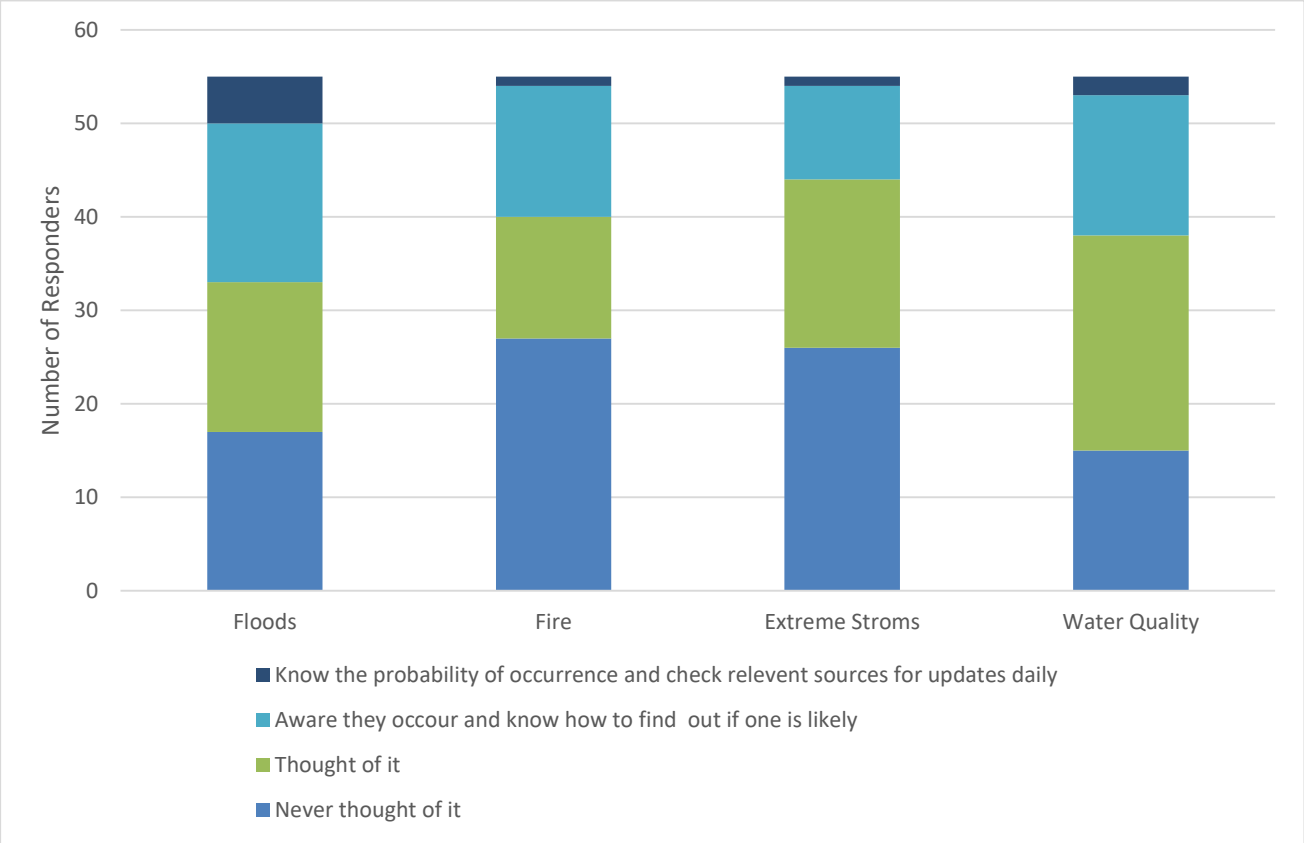


Figure 24 The awareness of potential natural hazards at Coes Ford

Fire had 27 people respond that they had never thought of fire events. There were 13 people who indicated that they had thought of fire and 14 people who knew fires could happen and knew where to look if one was likely. Only one person knew where to look to assess the fire danger and checked sources daily for updates.

The responders' awareness of extreme storm events had a limited knowledge base with 26 respondents selecting the 'never thought of it' option. There were 18 respondents who had thought

of the possibility of these extreme storms and about ten people were aware they occurred and knew how to find out information if one was likely. Only one person knew about the probability and checked the relevant sources daily for updates.

The final natural hazard assessed was water quality issues at Coes Ford. The data collected showed that 15 people had never thought of water quality as being an issue. Twenty-three people had thought of it being an issue; 15 people were aware it occurred and knew where to look to see what the water condition was like; only two people knew the probability of the occurrence of an event and checked the relevant sources for daily updates.

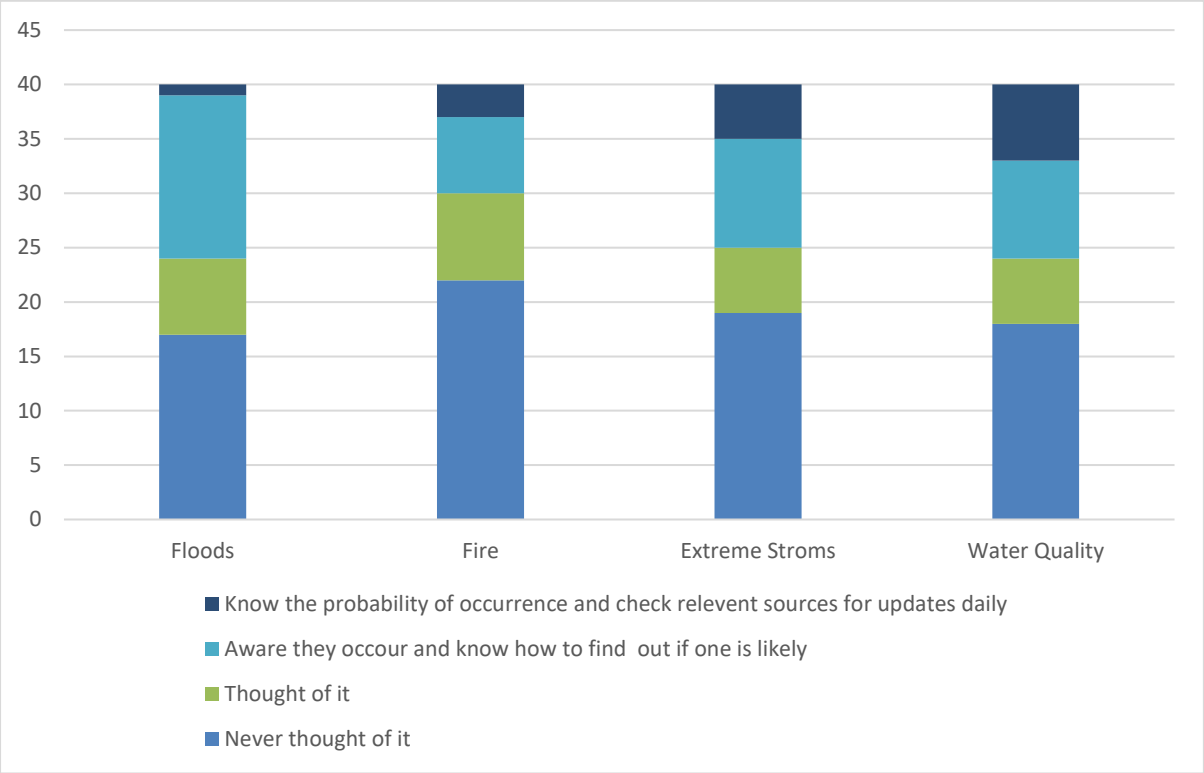


Figure 25 The awareness of potential natural hazards at Chamberlains Ford

Figure 25 shows the awareness of flooding, fire, extreme storms and water quality at Chamberlains Ford. The results showed that a small majority of people (17) had never thought of flooding. Seven people had thought of flooding, 15 people were aware it occurred and knew where to check if an event was likely but only one person knew of the probability and checked the relevant sources for updates on conditions.

The awareness of fires at Chamberlains Ford saw the majority of individuals (22) having never thought of them occurring. Eight people had thought of fires occurring, and seven people were aware they

occurred and knew where to look. Only three people responded about knowing the probability of fire events occurring and checking the information daily.

The number of respondents with an awareness of extreme storms saw most responders (19) having never thought of extreme storms. Six people had thought of them, and ten people were aware they occurred and knew where to look if an event was likely, while five people knew the probability of an event and checked the relevant information daily.

The level of awareness of water quality at Chamberlains Ford saw the majority of people (18) indicating they had never thought of this. Six people stated that they had thought of water quality as an issue. Nine people were aware this occurred and they knew where to look if it were an issue, while seven people knew the probability of it occurring and checked relevant sources daily for updates.

People appeared more likely to have thought of water hazards, such as flood and quality, rather than other potential hazards. This may be because there were no signs about potential storm events, but there were fire restriction signs present (Plate15). These four natural hazards then corresponded with the responses around the impact on their stay.

Plate 15 Fire restrictions sign

Figure 26 represents the awareness of water quality at both Coes Ford and Chamberlains Ford by each ethnicity. The New Zealanders were the best at knowing where to look if an event was likely at Chamberlains Ford compared to one New Zealander and one European knowing where to look for information if an event were likely at Coes Ford. This information was somewhat skewed due to the number of European responders; however, Europeans were still the majority of people at both sites who did not know that water quality issues existed.

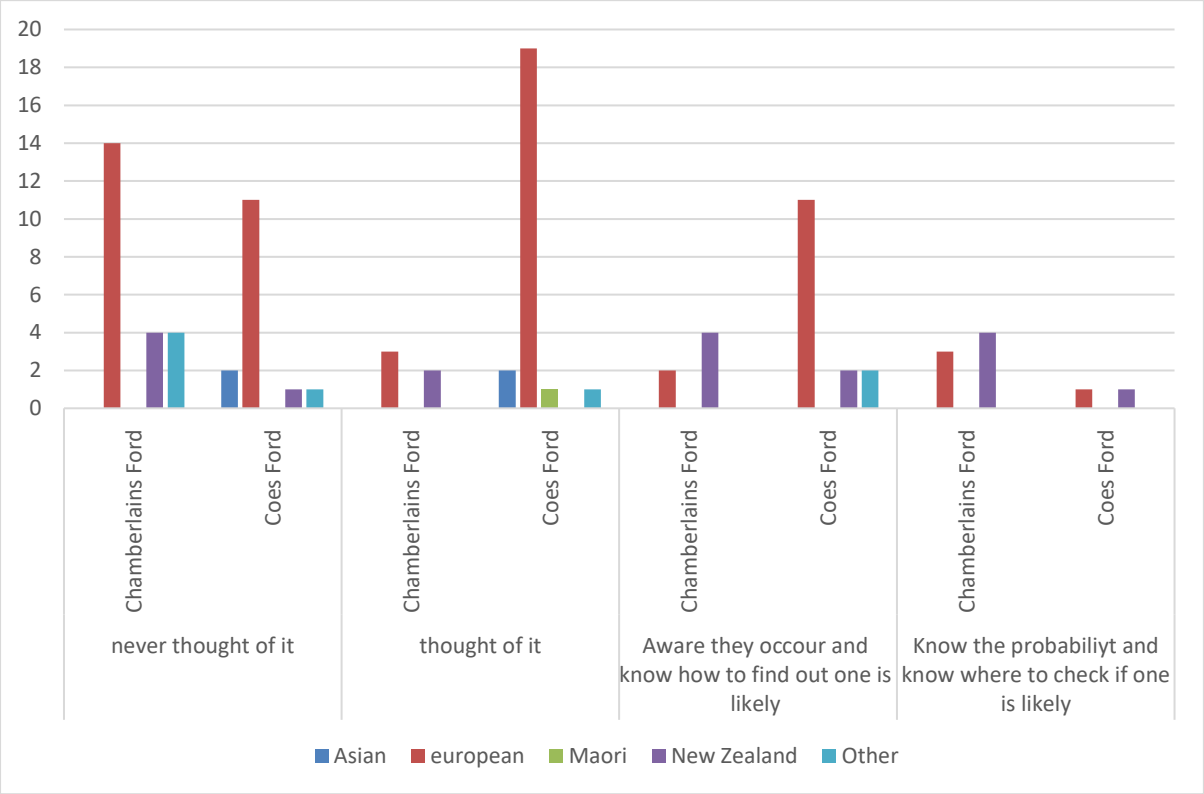


Figure 26 Ethnicity awareness of water quality issues

Figure 27 represents the awareness by each ethnicity about flooding awareness. Coes Ford had five responders who knew the probability of flooding and checked daily to see if an event was likely. Only one New Zealander knew about the probability of flooding at Chamberlains Ford and checked the information daily to see if an event was likely to occur. The ethnic groups Maori, Asians and the 'other' category did not know the probability of a flooding event. The Europeans had the highest number of people who were unaware that flooding could occur at either location.

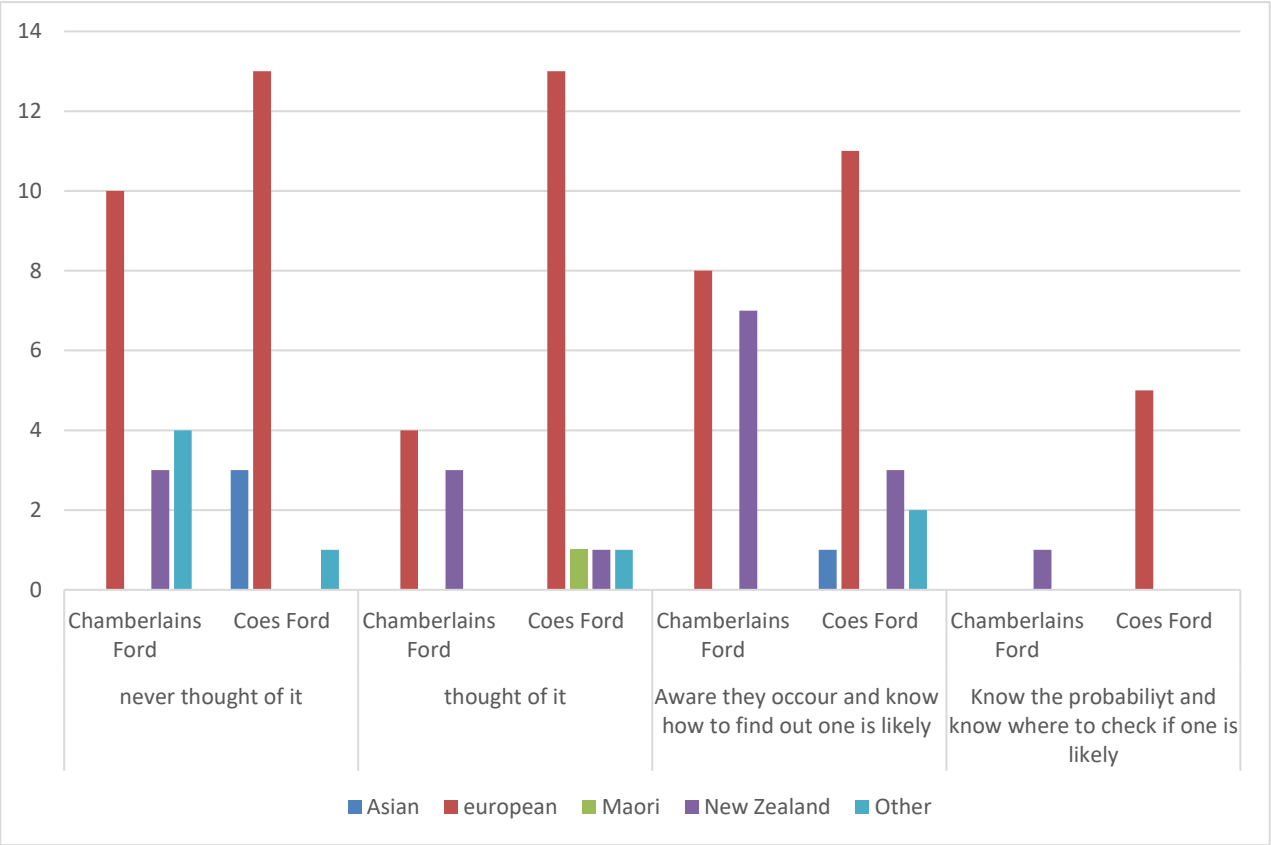


Figure 27 Ethnicity awareness of flooding events

4.3.3 Impact of Natural Hazards

Overall, the theme seen was that natural hazards had a limited or no effect on people staying at Coes Ford. The participants were then asked if these natural hazards had any impact on their enjoyment during their stay. The response saw over forty people saying that these hazards had no impact on their enjoyment of Coes Ford; this can be seen in Figure 28. No responders suggested that that these natural hazards had a major impact on their enjoyment while staying at Coes Ford.

Figure 29 shows the impact of natural hazards on visitors at Chamberlains Ford, with the majority of people indicating that natural hazards had no impact on whether they would return. Ten people indicated that the hazards would have a low impact on whether they returned. Four people indicated that they would have a moderate impact. Five people responded by saying that the hazards would have a high impact. Only one person indicated that the natural hazards would have a major impact.

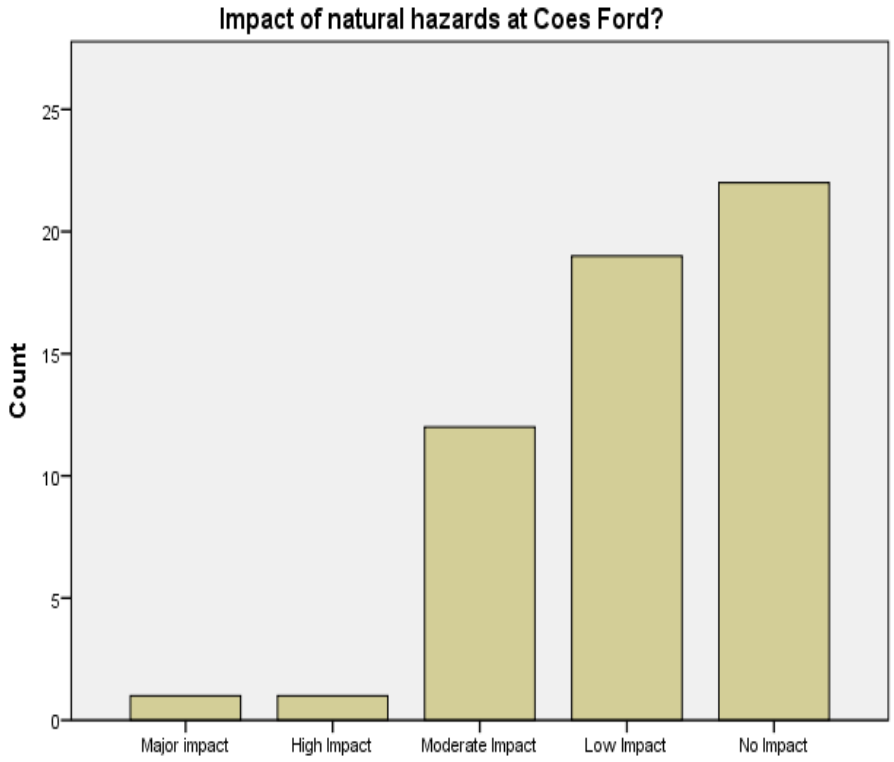


Figure 29 Impact of natural hazards on visitors' stays at Coes Ford

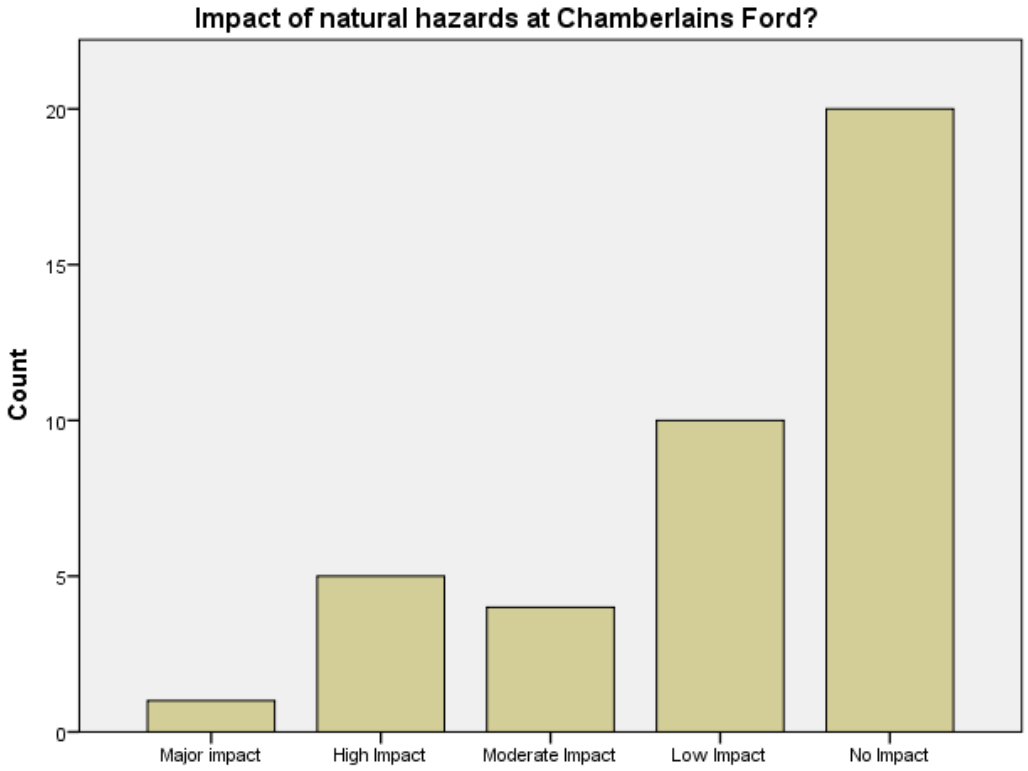


Figure 28 Impact of natural hazards on visitors' stays at Chamberlains Ford

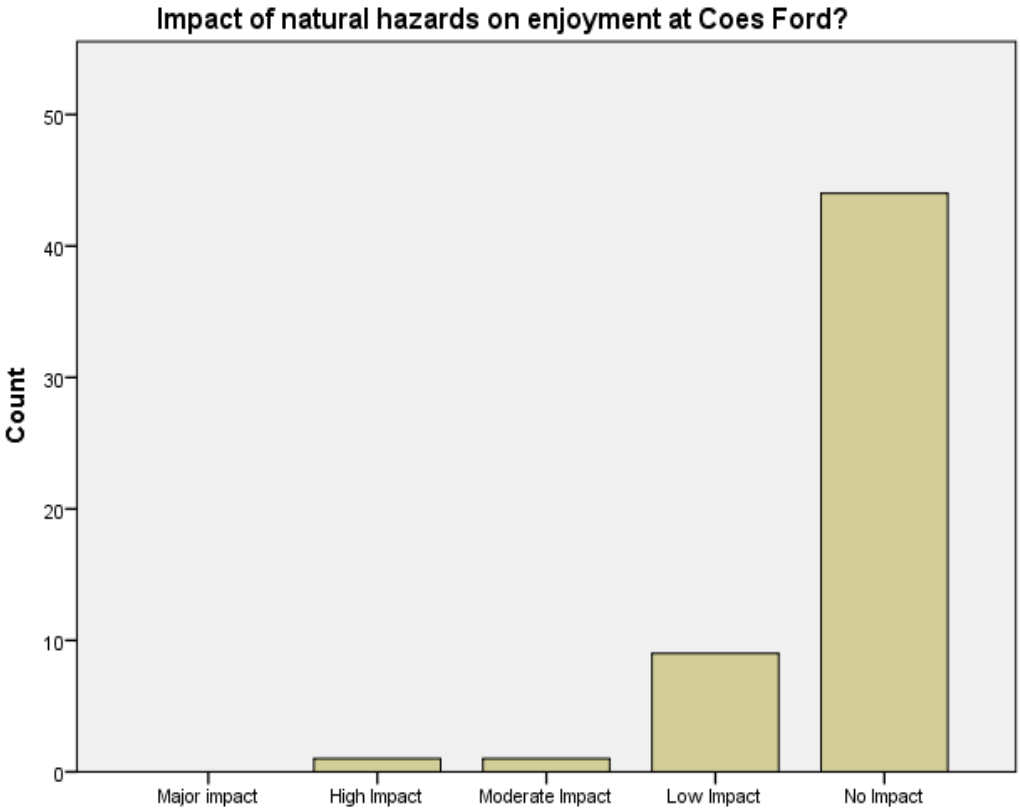


Figure 31 Impact of natural hazards on participants' enjoyment at Coes Ford

Figure 30 shows the impact of natural hazards on their enjoyment at Coes Ford with the majority of responders indicating that these natural hazards had no impact on their stay. Nine people indicated

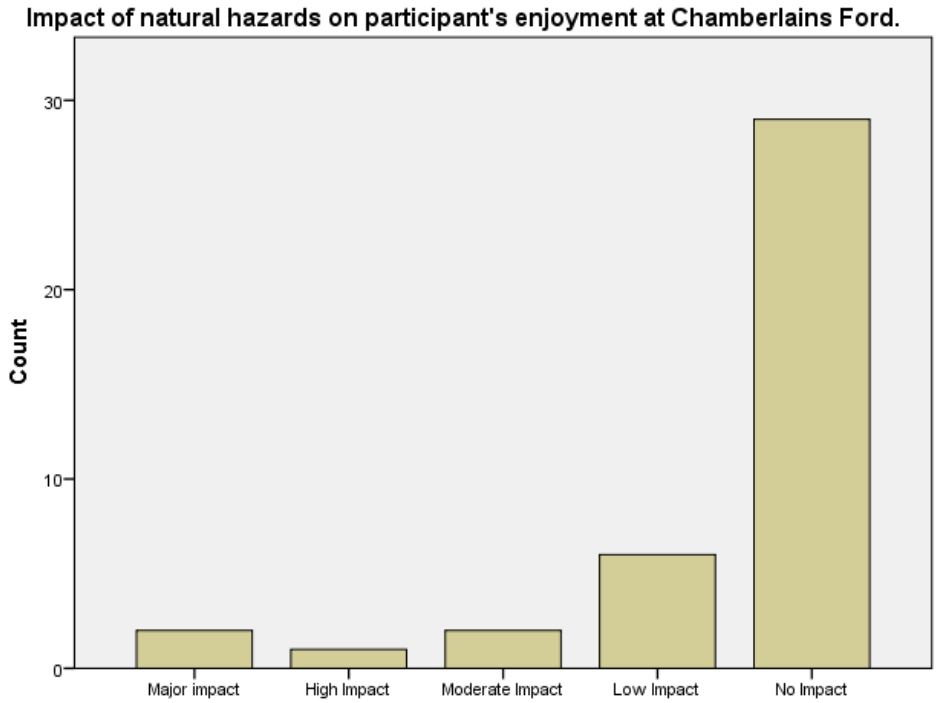


Figure 30 Impact of natural hazards on participants' enjoyment at Chamberlains Ford

that they had a low impact. Only one person said that they would have a moderate effect and one person said they would have a high impact.

Figure 31 indicates the impact on the enjoyment of people at Chamberlains Ford. The majority of people said that there was no impact on their enjoyment while staying at Chamberlains Ford. Six people indicated that there would be a low impact on enjoyment. Two people indicated that there would be a moderate impact. One person said there would be a high impact and two people said there would be a major impact.

4.3.4 Connectability to Networks

Within the questionnaire, responders were asked whether they listened to the radio while staying at Coes Ford. Thirty-three people indicated they never used a radio while at the site. Figure 32 shows the responders who listened to the radio at both Coes Ford and Chamberlains Ford, with 14 people reporting that they sometimes listened to the radio and eight people reported they used the radio all the time while at Coes Ford. Compared to Chamberlains Ford, 18 responders indicated they listened to the radio while staying at Chamberlains Ford. There were 16 people who indicated that they never listened to the radio and six people who always listened to the radio.

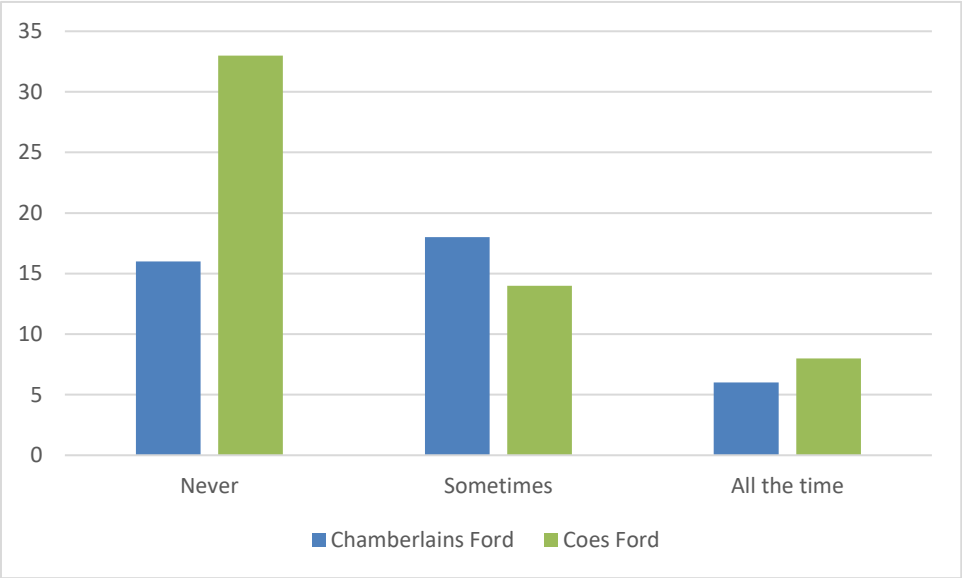


Figure 32 Responders who listen to the radio

The majority of people staying at Coes Ford used the internet or apps with 38 people indicating that they used the internet during their stay. There were 17 people who said they did not use the internet or apps. Chamberlains Ford saw 31 indicate they used the internet or apps during their stay, compared to nine people who did not use it during their stay.

4.3.5 Economic expenditure

Figure 33 outlines where most people staying at Coes Ford spent their money. For each of the locations selected most people did not spend their money there. Lincoln was the most popular location with Springston being the least popular. The 'other' category only had Christchurch as a location where responders spent money. Rolleston and Lincoln were the only sites where a responder spent $200.

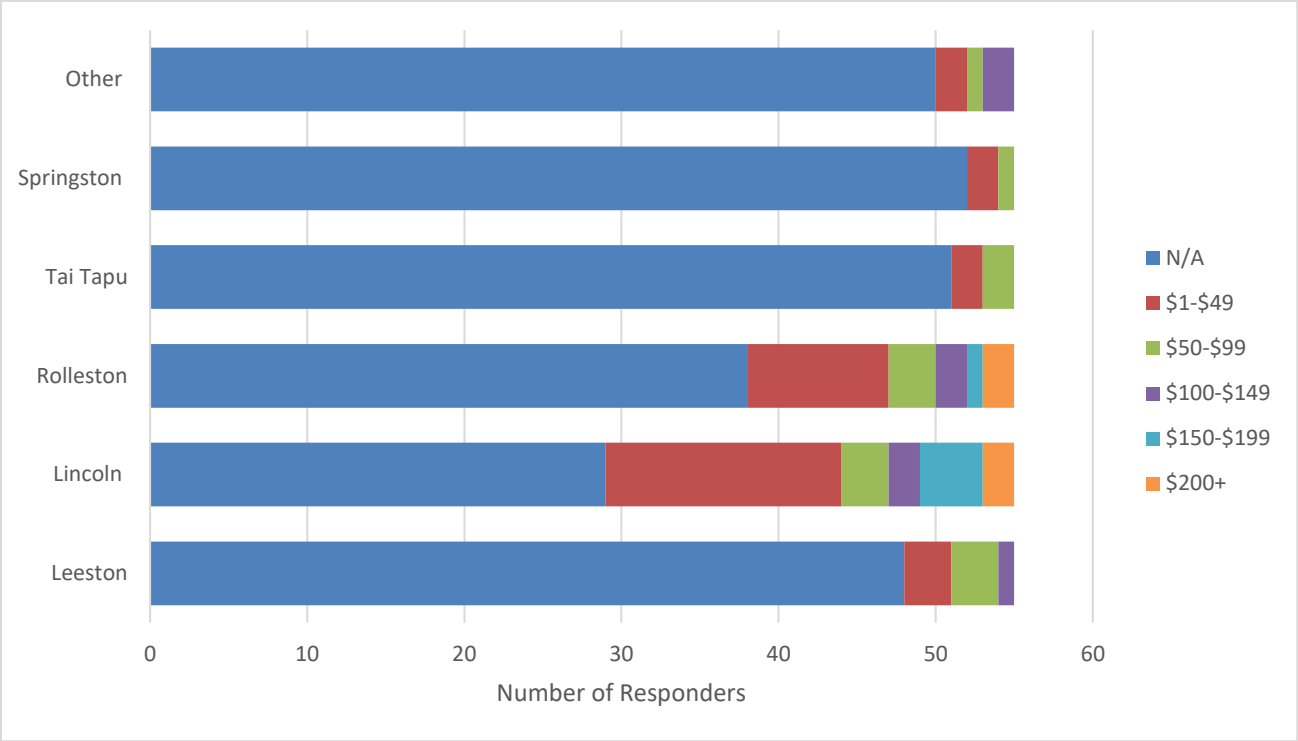


Figure 33 Where visitors spent their money while staying at Coes Ford

Figure 34 outlines where most people staying at Chamberlains Ford spent their money. For each of the locations selected most people did not spend their money there. Rolleston was the most popular location with Tai Tapu being the least popular. The other category only had Christchurch as a location where responders spent money. Rolleston, Lincoln, and the 'other' category were the only sites where a responder spent $200.

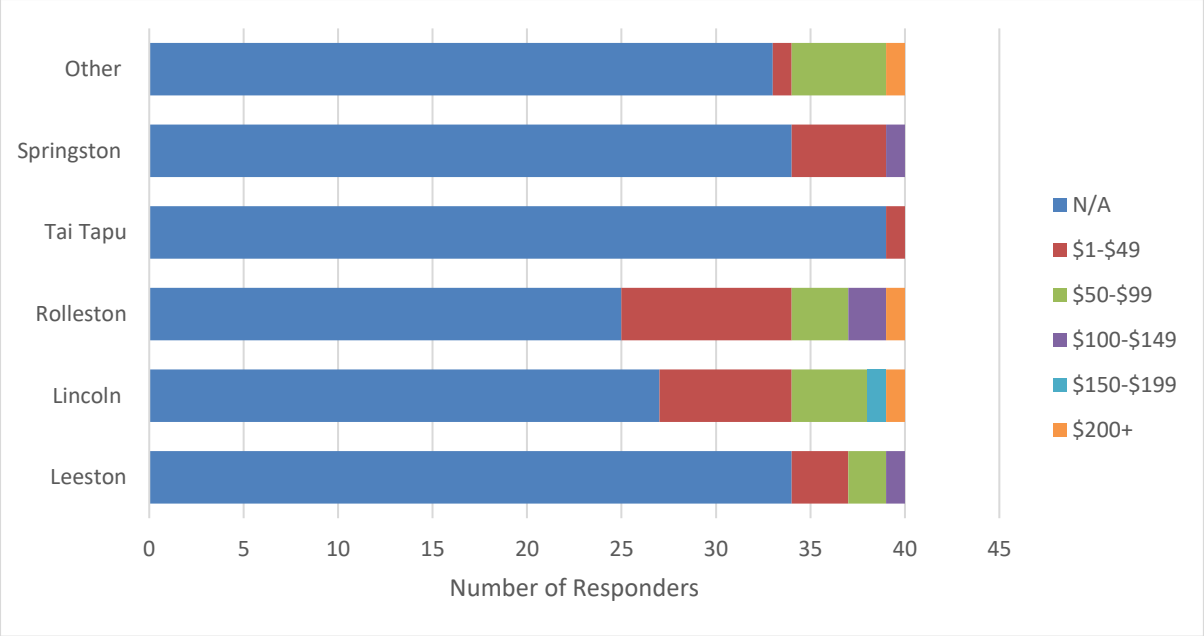


Figure 34 Where visitors spent their money while staying at Chamberlains Ford

4.3.6 Overall results

During the questionnaire process, the question was put to the participants about how they found out about Coes Ford and Chamberlains Ford. The results showed that the majority of people were using their phones or tablets to find information about these locations. Responders said that the locations were found by using apps such as *camper mate*, *wiki Camps* and *Camping NZ app*. The 'other' category included methods, such as word of mouth, rental companies suggesting it, friends informing them and driving past the Reserves. This was asked within the questionnaire and responders wrote down where they received information about Coes Ford and Chamberlains Ford.

The natural hazards mentioned in the questionnaire (water quality, extreme storms, flooding, and fire) were the main natural hazards which visitors thought about. The only other hazards mentioned were stock getting out into the area where people, vehicles and tents were located and boy racers using their vehicles inappropriately within the Reserves which could cause damage to people or property.

The overall results in the questionnaires showed a clear trend that both sites had a high percentage of international travellers who used both sites for freedom camping while they were travelling to and from Christchurch. The majority of people were travelling with their partners or friends with mostly overnight or one day stays at these sites. A smaller group of people used both Coes Ford and Chamberlains Ford as a place to stay due to their life situations, for reasons such as the earthquakes. Overall, people had not thought of the natural hazards present or thought of them but did not know

where to find information. The assets that the majority of people had on site were camper vans and cars, but there was a significant community who occupied house buses or motor homes. Both Coes Ford and Chamberlains had areas with their own communities who interacted with each other on a daily basis.

4.4 Interview Results

Several attempts were made to contact a variety of management groups for Coes Ford and Chamberlains Ford. The Fire Brigade, Police Department, Environment Canterbury and the Coes Ford and Chamberlains Ford management committee were approached to respond. However, only the Chief Fire Officer of the Lincoln Fire Brigade, Mr. Jeremy Greenwood, and Environment Canterbury's, Mr. David Culverhouse, responded in the month after being asked for an interview to the completion of the dissertation. This is a disappointing outcome. The main comments from the interviews obtained are reported below.

4.4.1 Fire Service response

The Lincoln Fire Brigade was asked a series of questions relating to how they managed natural hazards throughout the year. The average response time within the Selwyn District was within seven minutes of receiving an 111 call; however, rural areas differ depending on the station and how far away the event was from the station. The turnout time for the Lincoln Fire Service was around four to five minutes.

The main callouts during the summer period were vegetation fires. The main reason for the number of fires was the influence of weather as, depending on the summer, the weather could result in many fires driven by hot north-westerly winds. Over the holiday periods, vehicle accidents increased as more people were on the roads.

The interviewee indicated that the communities at Coes Ford and Chamberlains Ford can be problematic due to the range of visitors in the freedom camping sites. The broad range of young people resulted in issues and events for other campers, such as fires. This was a reason for the total fire ban at both sites due to the significant risk of fire spread.

The Fire service recognised that these sites were extremely busy over the holiday periods, with significantly more vehicles during the summer; hence, an increase in motor vehicle accidents.

The main callouts to these two locations were a result of the fire ban, as people were quick to report any fire. These were the main callouts to the sites; however, occasionally the sites were used to dump

stolen cars that were then set alight. Student bonfires were often a problem at Coes Ford. From the 8th of October 2015 until October 2016 there had been 10 incidents at Coes Ford and 16 at Chamberlains Ford. The main issues generally resulted from the consumption of alcohol at these two sites where the police were needed to help manage a large crowd while the fires were put out.

4.4.2 Environment Canterbury Response

Environment Canterbury was asked a series of questions relating to how they managed natural hazards at both sites. ECAN defines natural hazards by using the definition from the RMA 1991. This legislation defines 'natural hazards' as "any atmospheric, earth, water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affected or may adversely affect human life, property, or other aspects of the environment."

However, toxic algae were seen as a different problem outside this definition from the RMA. The risks of drought and earthquakes were considered to be a risk, but the main risk was considered to be some degree of flooding from the Selwyn River. Flooding out of the channel over the road at Coes Ford was not infrequent and could potentially occur up to three times a year. However, there may be years when this did not happen. The stop banks present at both sites were seen as being the primary

Plate 16 Chamberlains Ford in the 2000 flood event

protection for the surrounding land if an event was to occur and usually these stop banks contained the flood waters. It was very rare for an event to occur where the stop banks were breached.

The Flood Imagery Register (FIR) on the Canterbury Maps website shows the flooding events since 1945 along the Selwyn River. The register showed significant flooding events occurring in 1945, 1986, 1994, 2000 and 2013. Plate 16 shows the year 2000 event which flooded Chamberlains Ford. Plate 17 shows Coes Ford during the 2013 floods, which saw the water level well above the Ford.

Plate 17 Coes Ford in 2013 flood event

During the winter of 2016, ECAN carried out extensive maintenance work on the Selwyn River to remove in-channel vegetation, strengthen the stop banks and protect against gouging of the stop banks from floodwaters by roping the cleared tree debris to the stop banks. This has seen a major decrease of vegetation along the Selwyn.

The Selwyn River was not considered to be a serious flood risk problem by ECAN, but the opening of Lake Te Waihora (Lake Ellesmere) needed to be managed to stop the water becoming too high when a flood was expected. In this area, the only significant habitation area was the Selwyn Huts residents and some farms; therefore, increasing flood protection would be difficult to raise funds for.

The Waimakariri River did have a risk of bursting its banks and affecting the Selwyn District, but the secondary stop banks developed lifted the protection to better than a thousand-year flood event.

The water quality of the Selwyn River was considered to be high on the priority list, with a protocol developed between Selwyn District Council and the District Heath Board. This involved newspaper articles, media releases and signs at the points of toxic algae outbreaks. It was recognised that this will not be a quick fix and ECAN was working under the Canterbury Water Management Strategy (CWMS) and with the Selwyn/ Waihora Zone Committee to improve water quality.

Flood warnings followed a very clear protocol whereby timely flood warnings were given directly to key stakeholders and indirectly via their website. After any significant flood event, the protocol was reviewed to ensure that there was nothing in the flood warning system that can be improved. Police, Civil Defence management, media, KiwiRail, New Zealand Transport Agency and territorial authorities received flood warnings by established flood protocols. ECAN generally also directly contacted those they knew were likely to be affected.

Toxic algae were not generally a problem as people were aware it existed as it was obvious to the human eye, but there may be risks to pets.

4.5 Summary of the Results

The results from Coes Ford and Chamberlains Ford have given clear indicators as to how the hazards were managed. The observations have indicated the primary users of each site. Coes Ford was mainly used by vans, compared to Chamberlains Ford, which was mainly used by cars. Regarding where the people were located while at the two sites, Coes Ford had two main areas that were near the main toilet area (Zone 1) and in Zone 3 on the privately owned land, compared to Chamberlains Ford, which showed people were mainly located at the entrance and the toilet block in Zone 1. The questionnaire provided insights into the main ethnic groups, which were mainly from Europe. Most people present used the sites as a stopover point. However, Chamberlains Ford had a long term stable community as well as European visitors. There was a clear indication that people only stayed one day or overnight at both sites. The interviews raised important questions about managing hazards; the fire service had suggested that the main issue was fire at both sites. However, alcohol was an issue at Coes Ford as students often had bonfires that required the police to manage the crowd. Summer was the busiest period with more motor vehicles on the road due to the holiday period. Environment Canterbury suggested that the main issue was flooding. These results will be evaluated and discussed in the next chapter.

Chapter 5

Analysis and Discussion

5.1 Results of the Research

The aim of the chapter is to evaluate the results of the research by comparing and critically analysing them. There have been common themes seen at both research sites throughout this study. This chapter begins with a comparison of the site observations to provide a context for the subsequent comparative analysis of the survey data obtained from the respondents. This is discussed in the light of results from data collected during the preceding summer at Coes Ford (Winchester & Rennie, in prep.). The hazards will then be discussed along with the communication of these hazards with reference to the relevant literature. A discussion of the key findings ends the chapter.

5.1.1 Comparison of the Observations

Coes Ford was more popular, with 455 vehicles recorded as present during the twenty-five days of observation, compared to 421 at Chamberlain's Ford, Table 13. It was important to note that during the observations some vehicles were counted more than once. However, the major difference was the number of campervans present at the sites. There were 129 vans recorded (28% of the total) at Coes Ford compared to the 40 vans (9.5% of the total) at Chamberlains Ford. Both sites had similar numbers of buses with 92 at Coes Ford and 98 at Chamberlains Ford, which was about 20% of the total vehicles. Cars were more popular at Chamberlains Ford with 111 present compared to 87. Bicycles were not seen at Coes Ford, but Chamberlains Ford had 29 sightings over the five weeks. Motorbikes were not seen often at either site, with only one recorded at Chamberlains Ford. Both sites saw a number of motor homes present, 78 at Coes Ford compared to 85 at Chamberlains Ford.

The size of vehicle was important to note as this can impact on the number of people staying on site. For example, a campervan has the capacity to house more people than a small car. Vehicle size was broken down into three sections – small, medium and large. Small vehicles were typically cars and small vans. Medium sized vehicles were typically campervans and trucks. Large vehicles were house buses and motor homes. It was difficult to place an indicator on each of the vehicle sizes, however, the sizes were broken down into three sections such as two people per small car, four per medium and six per large vehicle size was seen during the observations. For example, the large vehicles generally only had two people staying in them; therefore, placing indicators on vehicle size would not be accurate.

Table 13 Comparison of vehicles at Coes Ford and Chamberlains Ford

Coes Ford			Chamberlains Ford	
Type of Vehicles	Overall average (total divided by 2)		Overall average (total divided by 2)	
Bus	92	20.20%	98	23%
Car	87	19.10%	111	26%
Bike	0	0%	29	6.80%
Motor Bike	0	0%	1	0.30%
Motor Home	78	17.10%	85	20%
Van	129	28%	40	9.50%
Truck	69	15%	55	13%
Total	**455**		**421**	

Table 14 compares the size of vehicles present at each site. The overall theme seen was that larger vehicles and smaller vehicles were more prominent at Chamberlains Ford at 38% and 40%, respectively, compared to no clear majority with all sizes around 33% only small vehicles had more with 34%, respectively for Coes Ford.

Table 14 Comparison of vehicle sizes

Coes Ford			Chamberlains Ford	
Size of Vehicles	Overall average (total divided by 2)		Overall average (total divided by 2)	
Large	149	33%	159	38%
Medium	150	33%	92	22%
Small	155	34%	169	40%
Total	455		421	

After the size of vehicle, the tent size was a better indicator as to how many people were using these sites. The size of tents has been broken down into three categories, small tents were generally one or two people, medium-sized tents generally had three to four and large-sized tents were five or more people. This then allows for an understanding of how many people were present with each tent. Table 15 indicates that Chamberlains Ford is the most popular site for camping with 114 tents present and

the majority (41%) of them were medium-sized. Small tents were not very popular at Coes Ford with only 13% of the total tents recorded.

Table 15 Comparison of tent sizes

	Coes Ford		Chamberlains Ford	
Size of Tents	Overall average (total divided by 2)		Overall average (total divided by 2)	
Large	36	42.80%	35	30.70%
Medium	37	44%	47	41%
Small	11	13%	31	27%
Total	84		114	

During the research, my observations were that Coes Ford had a temporary community with a significant number of international visitors who stayed for a few days or overnight. The Chamberlains Ford community, on the other hand, comprised more long term visitors, mainly from New Zealand, who were working in Christchurch or were homeless. This suggested that effective management and communication with these two different populations may need different approaches. The argument this raises was that the Chamberlains Ford community was not a transient community due to it comprising mostly long term visitors, compared to the much more transient community of Coes Ford. Coes Ford did fit the definition of transient community as there was a high turnover rate of people. Therefore, due to this, the transient community had a greater degree of risk and less resilience about natural hazards. International visitors to Coes Ford have a very limited knowledge base around the natural hazards present, such as the flooding and water quality issues.

5.1.2 Comparison of the Questionnaires

The questionnaires revealed a variety of key themes about natural hazard management. While the two sites have different communities, comparing the data showed there were significant similarities. Figure 35 compares the age range of people at the two sites, with the majority of people being under 34 at the two locations. A small number of people who were “thirty-five and over” occupied the sites, but Chamberlains Ford was more popular for older people. During the field observations, the Chamberlains Ford community was seen to have longer stayers in house buses and motor homes compared to the international overnight stayers at Coes Ford.

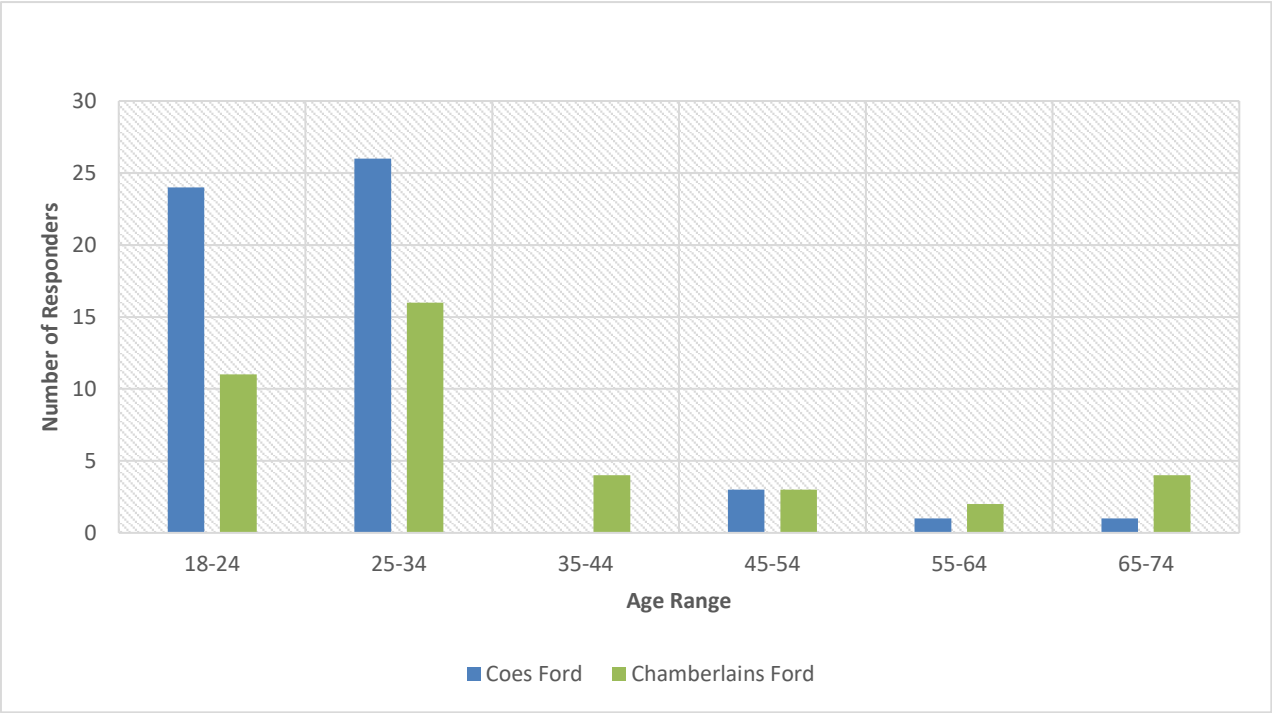


Figure 36 Comparison of Age

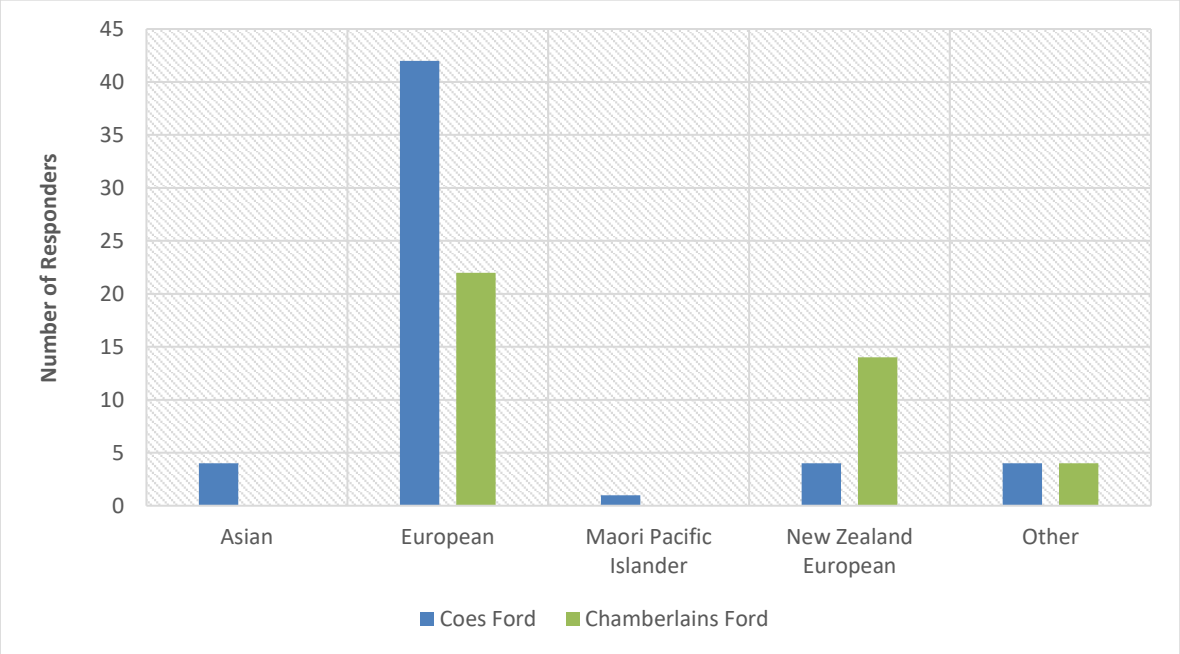


Figure 35 Comparison of ethnicity

A similar trend can be seen with the ethnicity types at the research sites (Figure 36). The majority of responders were from Europe; and this was consistent at both sites. The Coes Ford population was made up of mostly Europeans while the Chamberlains Ford community was made up of both New

Zealanders and Europeans. Chamberlains Ford had more long-term visitors, who were mainly New Zealanders (Figure 36).

The purpose of both sites was mainly 'stopping over', but this was due to the significant proportion of internationals. The rest were long-term stayers who were aware of the length of time they could stay but were staying no longer than allowed under the (Reserves Act, No. 66, 1977).

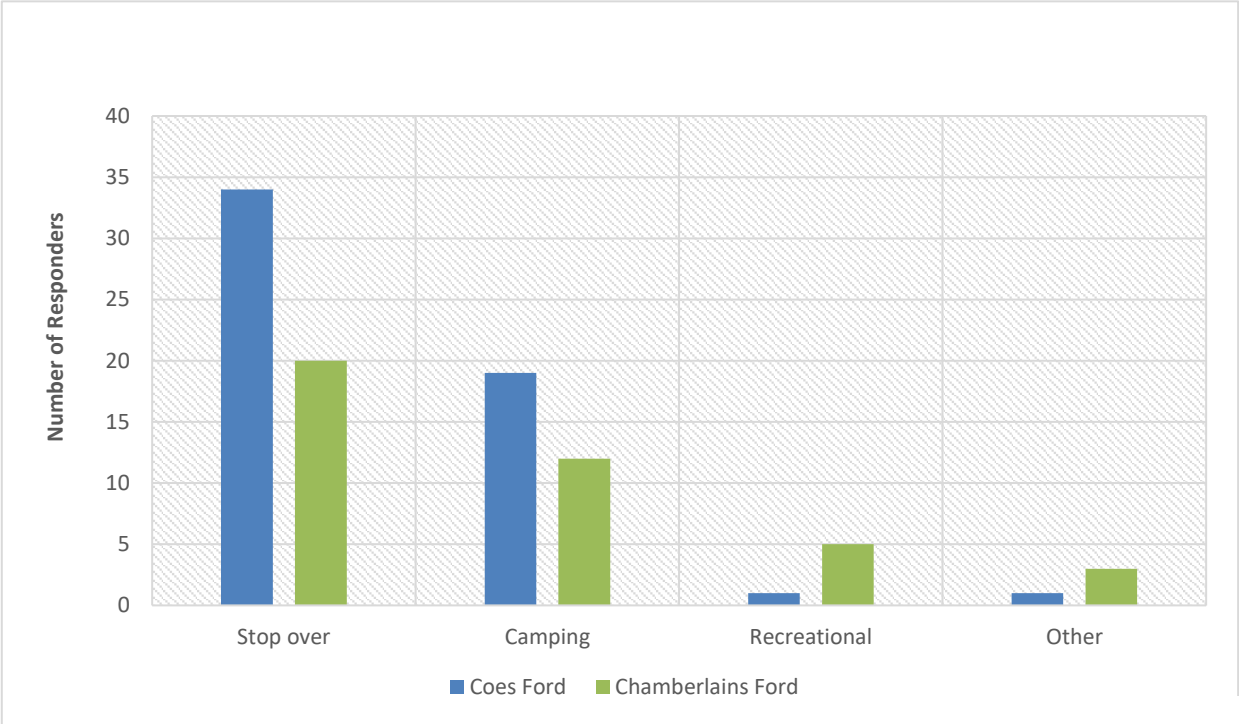


Figure 37 Comparison of the purpose of visits

Both sites were not very popular for recreational activities, which could be a result of the time of year the survey was undertaken. The 'other' category was made up of people who were homeless.

The comparison in Figure 37 indicated that most people at the two sites had never thought of the four hazards mentioned. Flooding and water quality issues were the two main hazards that people knew could occur. However, overall, most of the participants did not know where the information was available about these four hazards. Overall, both sites had few people who knew where to look for hazard information and/or checked it daily. More people knew where to look if an event was likely. If we compare Figure 37 with Figure 38, the impact of natural hazards on enjoyment at both sites, the overall consensus was that the hazards at these sites had no impact on people visiting the sites. This could be due to the time of the year the survey was carried out. The winter of 2016 was very mild compared to previous years and this could have had an impact on the results in the questionnaires. For example, if during the observational period the weather was more unpredictable and, as a result, saw more rain, the responders to the survey may have been more aware of flooding events

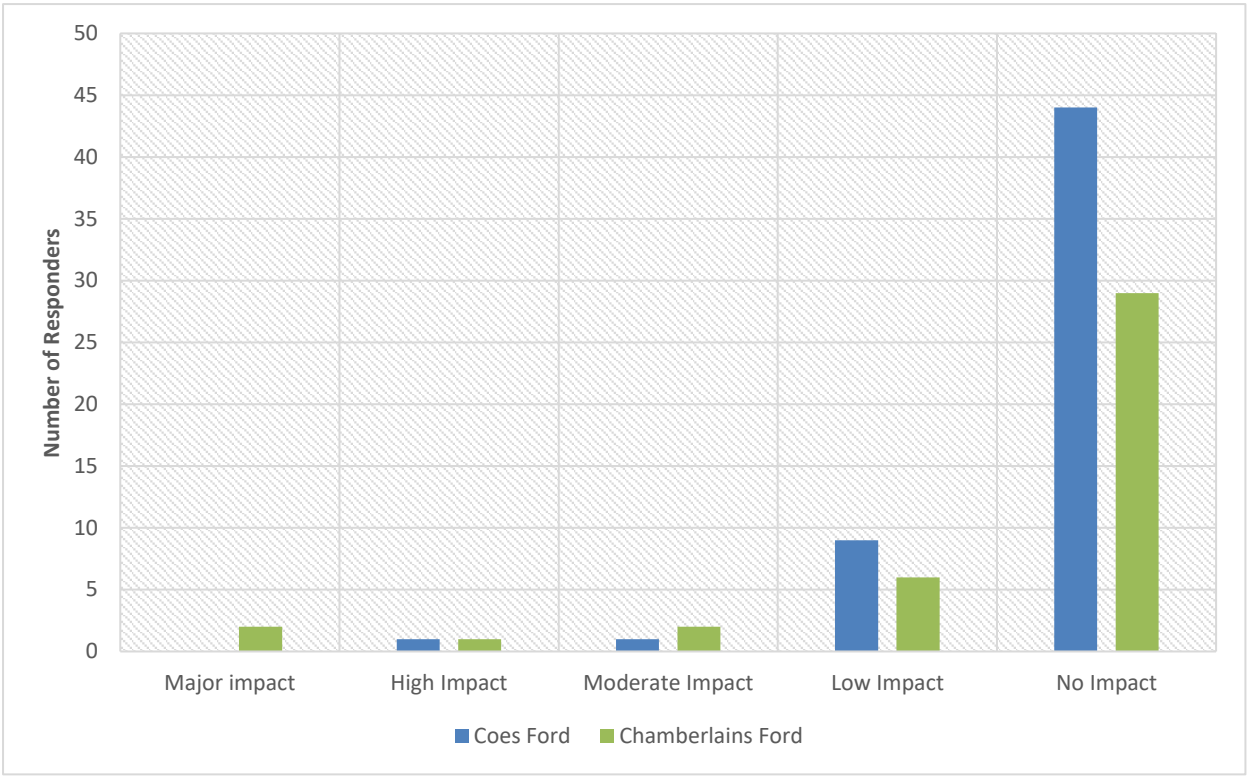


Figure 39 Comparison of the awareness of natural hazards

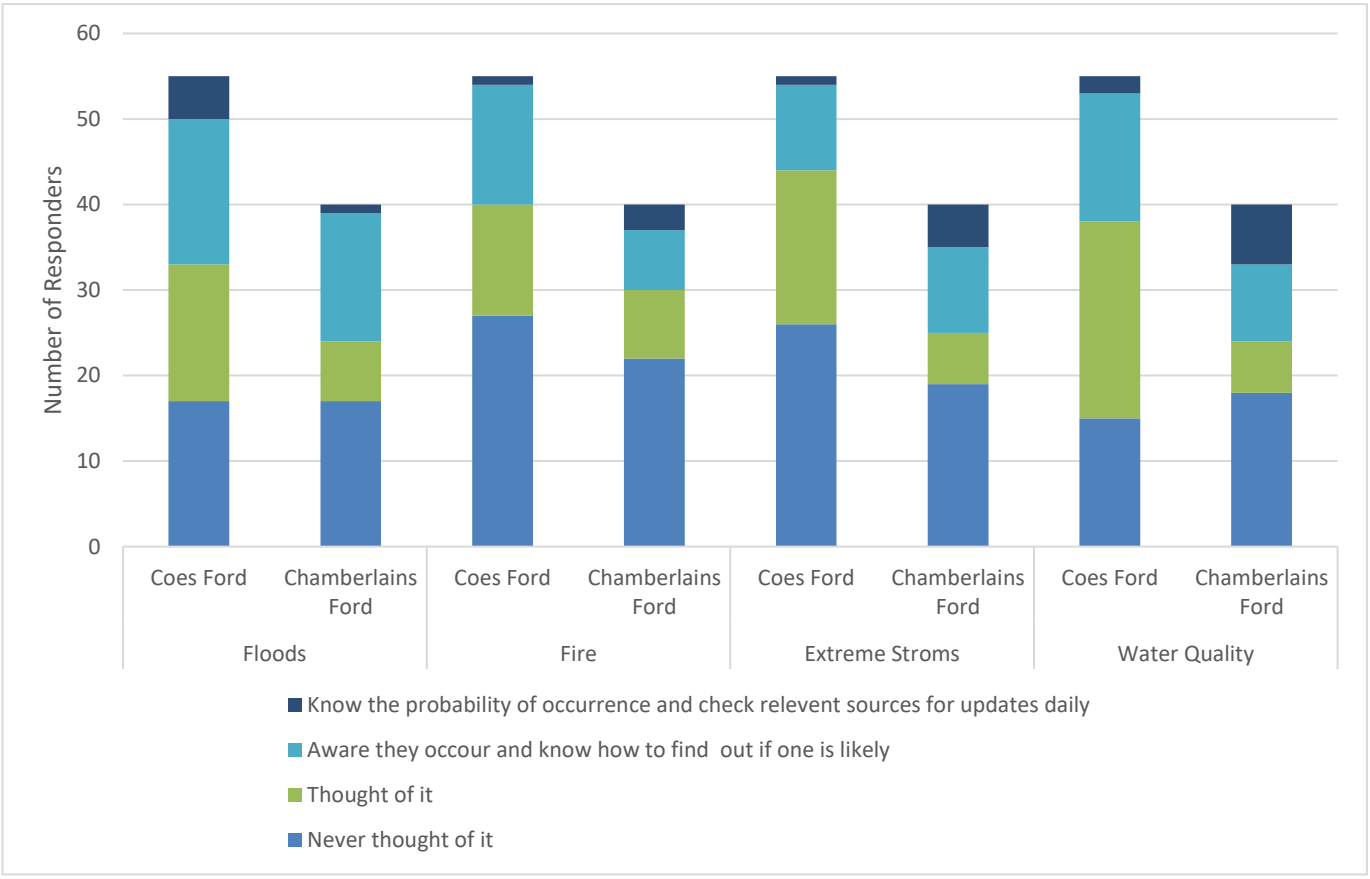


Figure 38 Impact of natural hazards on enjoyment at Coes Ford and Chamberlains Ford

Most of the responders did not spend money within the Selwyn District (Figure 40). However, of those

that did, the most popular location was different for each site. Lincoln and Rolleston had the closest large supermarkets in the area, but Leeston has a small Supervalue supermarket, which was the closest shop. As a result, both of these large super market locations were the most popular and this also included the most money spent at them. Most people spent between $1 and $49 at these sites with more being spent at Lincoln. This could be as a result of its proximity to Coes Ford. The direction of travel could be a factor here as if you travel from the north the closest shops are Rolleston and Lincoln. However, if you are traveling from the south, Leeston had the closest shops. Therefore, if there were fewer people coming from the south, there would be less money spent in Leeston. There was only a small number of responders who indicated they had spent money in other places.

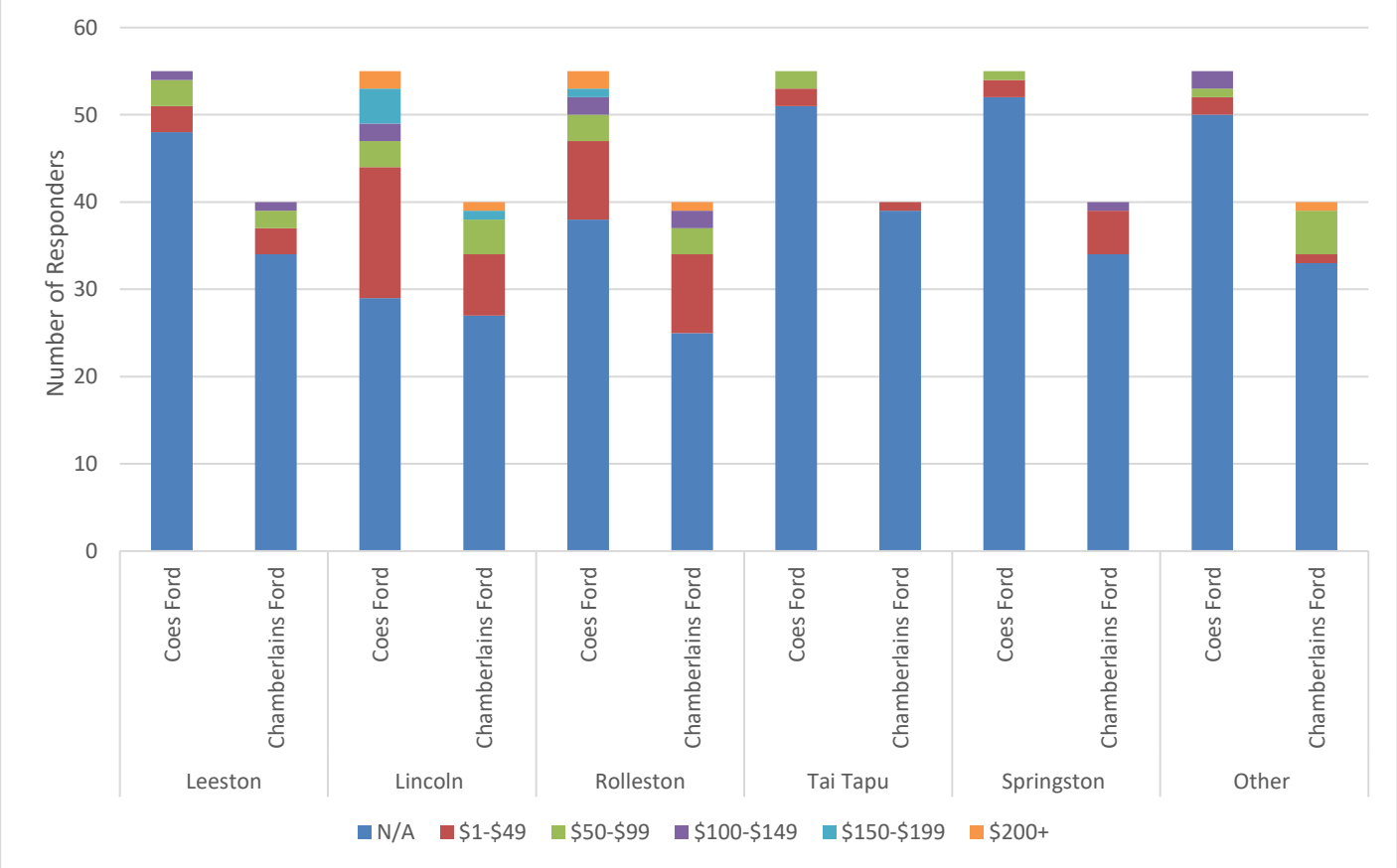


Figure 40 Comparison of where visitors spent their money

Table 16 outlines the average amount of money spent in each of the five places, taken from the questionnaire, including the 'other' category. This was worked out by taking the mid-point of each of the five categories and multiplying the number of responses. This showed the number of people who would, potentially, be lost if a natural hazards event was to occur and these people no longer visited the district.

Table 16 Average amount spent at each location

	Leeston		Lincoln		Rolleston		Tai Tapu		Springston		Other	
	Coes Ford	Chamberlains Ford	Coes Ford	Chamberlains Ford	Coes Ford	Chamberlains Ford	Coes Ford	Chamberlains Ford	Coes Ford	Chamberlains Ford	Coes Ford	Chamberlains Ford
N/A	48	34	29	27	38	25	51	39	52	34	50	33
Totals	$445	$350	$1950	$850	$1275	$900	$200	$25	$125	$300	$375	$600

Figure 41 indicates where the most money would be lost if an event was to occur that meant these rules were not able to be used during the period of the survey. It also shows the total of money which could potentially be lost if a disaster was to occur. Lincoln and Rolleston would have the biggest effect compared to Tai Tapu, which would have the smallest effect. This corresponded with the location of the local large supermarkets.

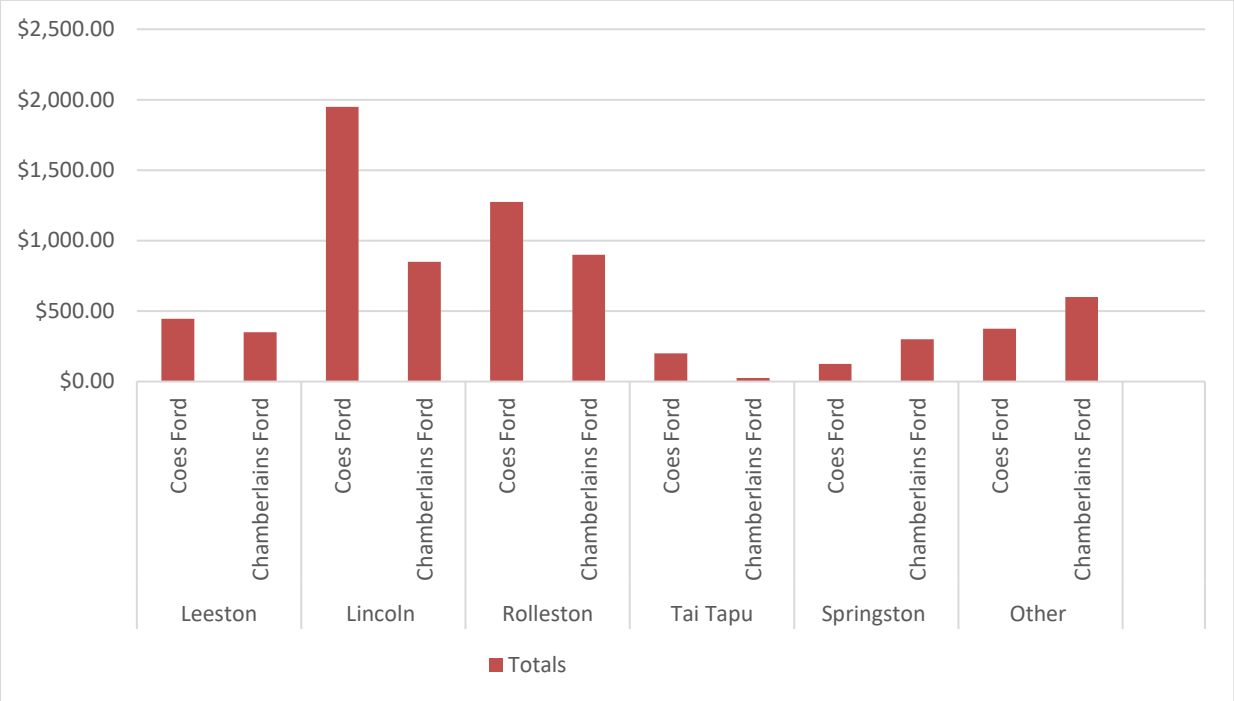


Figure 41 Average amount spent at each location

5.2 Coes Ford Summer Research Results

From 18 January to 19 February in the summer period of 2016, the same research questions were asked, but only for Coes Ford, and no questionnaire survey data was able to be collected (Winchester and Rennie, in prep.). The preliminary results of these observations have been drawn on for this research. First, those results showed that the majority of people staying at Coes Ford preferred the main area by the newly-built toilets. Secondly, there was a significant distribution pattern for the types of vehicles present at Coes Ford. Small to medium-sized vans were the preferred travel option. Allowing people to sleep in the back of the vehicles without having to set up tents tended to lead to a high turnover in visitors, with many people staying no longer than two days. International people made up the bulk of this community. These results appeared consistent, but on a much smaller scale, than those obtained from this research and this suggested that the results from the winter may be indicative of the summer attitudes and knowledge of the area as well as the other variables reported here for Coes Ford.

The observations gained from the campsite during summer were that there were only two signs notifying people of the dangers of algal blooms in rivers. The observations noted that the algae were

building up on the edge of the water where there was a limited flow. As a result of the warm temperatures, the algae had perfect conditions to continue to grow. Many international people were seen to be using the water late in the day during summer. This was not the case during the winter observations despite some warnings of potential blooms on the signs at times, suggesting (as would be expected) that there was a higher risk of algal bloom exposure in the summer, but also that the signage had a minimal effect.

Regarding flood prevention, there was a small sign located on the new toilet block in Zone 1, which was the most popular area for camping. This sign included a small (font) sized phone number for the Selwyn District Council, which was to be contacted if there was an emergency. Unfortunately, the survey did not seek to find out if campers were aware of who to call in an emergency or where to obtain that information.

What was clear to see while undertaking the research at the reserve (in summer and winter), was that the toilets were important to the popularity of the location and had a significant impact on where people were situated in the reserve when staying overnight. The majority of people were located in Zone 1 nearest the toilets with a small number of people living on the private property in Zone 3. These also were the two areas with toilets within them. Zone 3 had two portaloos located in the middle of the area. Zone 1 also had a large recycling skip to help reduce rubbish found at the reserve. Due to the removal of portaloos from Zone 2 at the beginning of the 2015 summer (November), instead of people using the toilets across the road many travellers were seen to be dumping their 'human waste' in the bushes, creating a potentially significant health issue during the summer observational period, which continued to be an issue when Coes Ford was busy.

In contrast to the observations during the summer, was the number of house buses located at Coes Ford. Many of these buses were staying at the sites for 28 days then moving on as their time ran out to stay there (i.e. before they fall foul of the camping legislation as part of the Reserves Act, No.66, (1977)). With the exception of the permanent area in zone 3, many of the house buses were located in Zones 1 and 2 during summer.

This research was not part of this dissertation research, but it highlighted the differences between the winter results and this data that were important to understand. The data collected during the winter research was different in regard to the number of people present at Coes Ford. During summer there

were more vehicles present during the five-week observation period between 18 January and 19 February.

Table 17 shows a comparison of the size of tents during the winter and summer periods. The T represents the Total number and the % represents the total percent. The clear difference was the number of tents during these two periods. Summer had the majority compared to winter. Winter only had a small number of tents present. This can be a result of the weather conditions during the observation period. During summer, the weather was predominantly fine and sunny compared to the overcast and cold temperatures during the winter period. Therefore, Coes Ford was more popular for camping during the higher temperature months over the summer period.

Table 17 Comparison of tents sizes Coes Ford during summer and winter observations

Size of tents during Field Observations																				
Size of Tents	Week 1				Week 2				Week 3				Week 4				Week 5			
	Summer		**Winter**		**Summer**		**Winter**		**Summer**		**Winter**		**Summer**		**Winter**		**Summer**		**Winter**	
	T	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**	**T**	**%**
Large	11	8%	40	60%	23	15%	18	41%	23	14%	14	32%	11	8%	1	9%	15	11%	0	15%
Medium	28	19%	21	30%	48	31%	20	45%	36	22%	21	48%	24	17%	9	82%	15	11%	4	37%
Small	106	73%	6	9%	82	53%	6	14%	106	64%	8	18%	102	76%	1	9%	111	79%	2	17%
Total	**145**		**66**		**153**		**44**		**165**		**43**		**137**		**11**		**141**		**6**	

The comparison of the numbers and types of vehicle at Coes Ford also showed that there were more people present during the summer period. In general, there were about 100 more vehicles present during summer than in winter. This, again, could be a direct result of the weather conditions as well as there being more tourists travelling during the summer than in winter. The main two vehicles that used Coes Ford during the summer were the same as the winter period. The same trends were seen over the summer period in regard to the types and sizes of vehicles.

Table 18 Comparison of number of vehicles at Coes Ford during the summer and winter observations

Number of Vehicles	Week 1				Week 2				Week 3				Week 4				Week 5			
	Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter		Summer		Winter	
Bus	13	4%	35	19%	30	10%	40	22%	44	13%	41	22%	44	12%	34	19%	30	10%	34	19%
Car	98	35%	43	24%	77	26%	47	25	82	25%	39	21%	118	32%	24	13%	118	39%	20	11%
Bike	3	1%	0	0%	5	2%	0	0%	0	0	0	0%	0	0%	0	0%	0	0%	0	0%
Motor Bike	6	2%	0	0%	6	2%	0	0%	6	2%	0	0%	1	0.2%	0	0%	2	0.60%	0	0%
Motor Home	44	16%	34	19%	27	90%	33	18%	44	13%	30	16%	29	8%	30	17%	28	9.30%	28	15.30%
Van	93	33%	48	27%	116	40%	38	20%	127	39%	50	27%	149	41%	54	30%	91	30%	68	37%
Truck	20	7%	18	10%	31	10.60%	27	14%	23	7%	25	13%	20	5%	36	20%	31	10%	31	17%
Total	277		178		292		185		326		185		361		178		300		183	

The overall themes were, as follows: careful communication to the public was vital for expressing the natural hazards at the Reserve. This would mean that the public felt they were fully informed about the risks. The field observations have given a clear indication of where people were located and what type of vehicle was most popular. In terms of the other hazards present at Coes Ford, fire was a major risk, particularly during summer with the hot, dry conditions. The concern that with overgrown scrub and bush would result in a fire danger as fire can spread along the river bed quickly in summer due to low flows and the high amounts of bush. However, as seen during the winter observations, the vegetation at Coes Ford was removed.

5.3 Hazards Present at Both Sites

After collating the data from the questionnaires, observations and interviews and the main natural hazardsall had revealed different potential impacts. The main risks present were floods, water quality

issues, extreme storms and fires. While these four hazards were present, other hazards were also present and were raised by participants in the questionnaires; these included boy racers, including motorbikes and four-wheel drive vehicles. While vehicles were not a natural hazard, it was important to address it as most often there were small children present at camp sites who did not specifically have a parent or caregiver looking after them. This was a significant issue, mainly during the summer periods, when not only Coes Ford and Chamberlains Ford were busy but this was also the peak period for visitors. Stricter rules or traffic slowing methods might usefully be investigated to avoid a tragedy in these communities.

Flooding was an important issue for camping and, specifically, for transient communities as many camping grounds were located along river ways or beauty spots throughout the country (Civil Defence Emergency Management Act 2002. No 33). As was apparent from the literature reviewed in Chapter 2, early warning systems were important for being prepared for potential events; these early warning systems needed to be clear and give effective communication. This was essential for protecting these transient communities. Most importantly, communication before events occurred, was the key to increasing visitors' knowledge of the area. This can be applied to Coes Ford and Chamberlains Ford, particularly as the main population was international travellers who have no previous knowledge of the landscape. Building the knowledge base of visitors will improve awareness and, potentially, allow the appropriate responses in the possible event of a flood or any other hazard. This also corresponded with managing the early warning systems. If an event had a high probability of occurring, the various communities should be notified by those responsible for their safety, the reserve area, or managing the impacts of an event. Communication and early warning systems could reduce the overall effect and help with increasing resilience (Wagner & Zia, 2015, p. 190). Building resilience was also very

Plate 18 Example of Cyanobacteria (Blue Green Algae)

Plate 19 Example of Cyanobacteria (Blue Green Algae)

important for these communities, and supports (Cutter, et al., 2013) view that a shift from reactive planning to proactive was needed for these sites.

Water quality has quickly become one of the biggest issues throughout New Zealand. During the summer months Coes Ford has a real problem with algal growth as a result of low flows, high temperatures and the increased nutrients present. In the questionnaires participants were asked if they were aware of the water quality issues at both research sites; Coes Ford responses indicated that about fifteen respondents did not know the issues present at Coes Ford. The site could be improved from what was seen as confusing communication as a result of the location of the hazard signs. The main issue was that the water quality signs were not located where swimmers could see them. This was seen from the questionnaire responses that showed only a small number of responders knew where to look for the information about algal blooms. These signs were located beside the Ford which crossed the Selwyn River and, therefore, were only seen when driving across the river, not when accessing the Selwyn via Coes Ford Reserve. Following on from the points made about flooding, effective communication was vital to increasing the knowledge base of visitors. As mentioned above, most of these communities have no prior awareness of the landscape and will happily swim in the water. As seen in these observations, Cyanobacteria (Plate 18 and 19) was present at both sites but mostly at Coes Ford and this can have a significant effect on animals, such as dogs, if ingested. Increasing the awareness of visitors is important to reducing the effects of natural hazards along with building resilience; and the first step to creating better resilience was better communication. Plate 20 is an example of good communication regarding toxic algae but where these signs were currently located at Coes Ford meant that the majority of people were not aware of the issue with the waterway.

Plate 20 Example of a water quality communication

5.4 Communication of Hazards

The natural hazards present at both sites were communicated in different ways across the sites. In comparing each site it was seen that both have different set ups with Chamberlains Ford being the better of the two. Chamberlains Ford consisted of information located at the entrance ways into the reserve and included information as shown in Plate 21. All the relevant information was located on this sign in comparison to Coes Ford, which had a number of signs located along the main road that travelled through the Reserve. Plate 22 outlines the disjointed nature of Coes Ford's approach. The literature outlined that communication needed to be clear and easily understandable; particularly in this case, due to the significant numbers of international visitors to both sites as their knowledge base was limited. Having clear messages and guidelines helped reduce the risk and events from occurring. Chamberlains Ford allowed for this with information at the access points into the reserve compared to Coes Ford, which had a number of signs located in areas where people could not see them; for example the water quality information about algal blooms. Therefore, communication can be improved at Coes Ford simply by rearranging the information present and simplifying it. With a community of people who have limited knowledge of the conditions and potential effects clear communication is critical for protecting people at these transient locations.

Plate 21 Chamberlains Ford Hazard Information

Plate 22 Coes Ford Hazard Information

The bulk of the literature reviewed argued that communication was vital for informing people at transient locations. It also highlighted the gap between risk communication and tourists in transient locations. My research argument suggested that there was more to communication than simply considering all camp ground communities as homogenous. Instead, as Cutter, Boruff, & Shirley (2003) suggested, these transient communities needed to be understood for their individual but, consistent, characteristics. Each site has different characteristics throughout the year and these results suggested they stayed reasonably consistent. Cutter also argued that resilience needed to be built within each community; this research has also argued that this needs to occur. This research showed that each community needed to have the ability to bounce back as a result of an event; therefore, management groups needed to ensure that each community was aware of potential events and the procedures to be taken during a harzard event (Paton & Johnston, 2001, p. 273). This was especially important for Coes Ford and Chamberlains Ford as each site was located in the rural environment and away from emergency services.

5.5 Assessment of Risk for Transients at Coes Ford and Chamberlains Ford

Based on the research, the development of the transient vulnerability framework should aim at improving the evaluation and communication of risk at Coes Ford and Chamberlains Ford and similar sites. The framework that was developed, as seen in Figure 8, established the formula to reduce risk by improving knowledge and the communication of natural hazards at specific locations.

The key steps to this framework allowed for the constantly changing environment to be updated to improve the resilience at the selected site. The first step involved a risk assessment of the whole area, as Coes Ford and Chamberlains Ford both had different risks during different seasons. It was important to understand what these were: for example, flooding, water quality issues, fires and extreme storm events. Following this, building up the knowledge base about who occupied these spaces was a key in having effective communication. For example, Coes Ford has a large community of European travellers who did not have an extensive knowledge base about the possible effects while staying there. In comparing Coes Ford to Chamberlains Ford it can be seen that the community was vastly different with a large proportion of New Zealanders who stayed at this location long term. Therefore, their knowledge base was larger than the short term visitors. This second step involved gaining an understanding of the types of assets that were located on the sites; for example, Coes Ford had many people camping in tents and camper vans along the river's bank behind the vegetation. If a flooding event was to occur these people were very close to the water and would need to be moved quickly. This provides a picture of the potential groups of people and their main locations when formulating a plan on how to manage an event. Step 3 evaluated the risk of an event, such as the water quality at

Coes Ford; this had a significant effect as people cannot swim in the water due to the build-up of algae within it. The possible effects were also evaluated, which aimed to reduce the impact of each event. Step 4 was where all the information received in the previous steps came together to formulate a plan about how to manage each event if/when an event was to occur. These plans were developed before an event occurred so they can be followed through if an event happened. The final steps were very significant for this approach as the weather patterns changed and the communities' make up and new information was needed to understand each site. Continual monitoring will help maintain and build the knowledge base on each site; for example, Coes Ford has a significantly larger population during summer than winter, which was seen in the observations obtained during the two five-week observation periods. This information builds a platform to manage for likely events as the communities' groups were understood, including their possible locations and also the potential natural hazards present.

5.6 Discussion of the Key Findings

There has been much debate around water quality, not only on the Selwyn but also throughout New Zealand. Environment Canterbury (ECAN) is the regional council which controls the Selwyn River catchment area. The council was charged with managing the recreational water quality along the Selwyn; a website indicated the quality of the water for the region. Figure 42 is ECAN's website information on the quality of the water along the Selwyn River. Chamberlains Ford has been classified

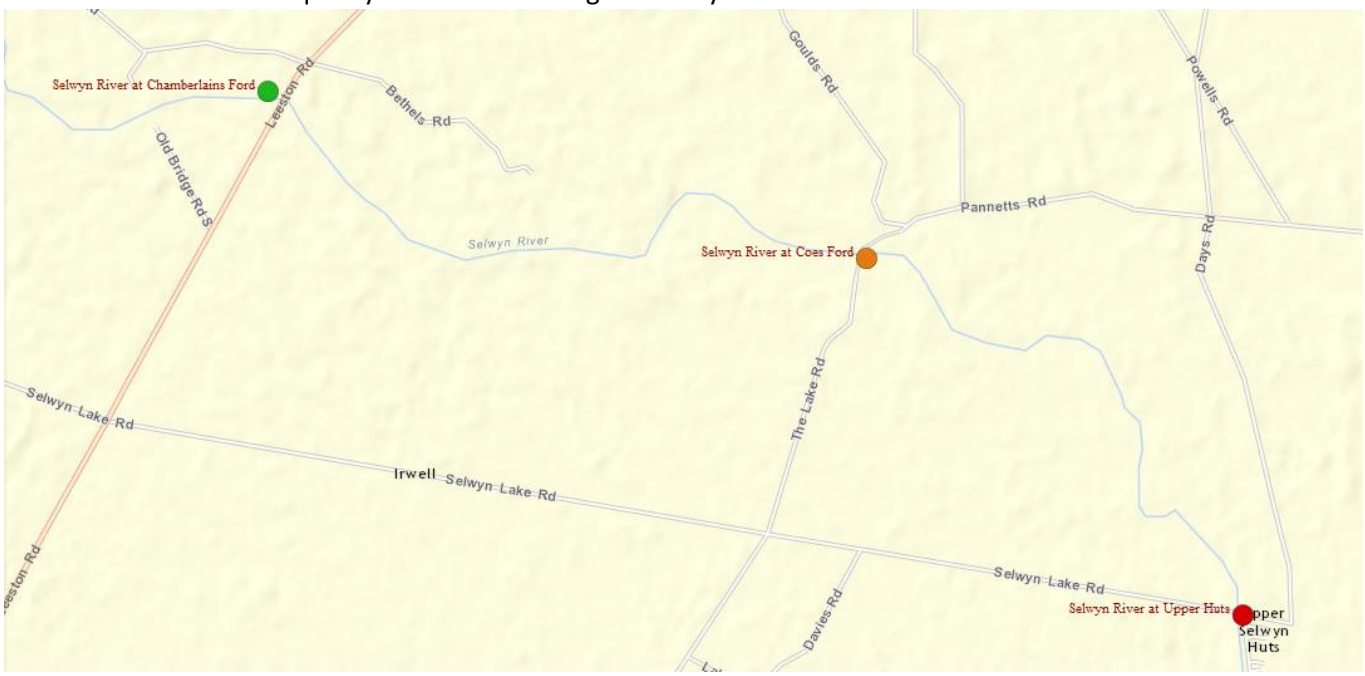


Figure 42 Recreational water quality for the Selwyn River, sourced from (Environment Canterbury, 2016)

as good, which stands for satisfactory for swimming most of the time. However, this may change due

to rainfall. Coes Ford was classified as being poor; this stands for generally not being suitable for swimming, as indicated by historical results. These classifications fit well with the observations made at both locations, as during the summer Coes Ford was seen to have significant areas of algae build-up. The winter period saw limited areas of algae present, but there was more present there than at Chamberlains Ford.

Coes Ford and Chamberlains Ford each had clear themes as to who used these sites, what their awareness of natural hazards was and how these hazards were managed. The observations indicated that the primary users of each site were international travellers; this was backed up by the questionnaires and seen during the observations. Coes Ford was used mainly by vans, compared to Chamberlains Ford, which had cars and house buses. Chamberlains Ford had a community of people who were long term stayers, which meant this community might need to be managed differently from Coes Ford. The questionnaires revealed that half of the people did not know what hazards were present at each site. With a large proportion of visitors to both sites beings internationals, this then explained why there were limited numbers of people who had a sound knowledge of each site about the hazards present and where to find out the information. There were very few people who knew where to access this information about them. This was a key finding and showed that clear, effective communication was vital for building visitors' knowledge bases about potential adverse effects Therefore, the fact that there were only a limited number of people who responded positively suggested that the makeup of the community was important. Overall, the awareness of both communities was limited. With both sites having a large number of overseas travellers, clear information was vital for their protection.

Chapter 6

Conclusions

In conclusion, the two sites investigated have all indicated/revealed clear themes. The aims of this research are set out below, where each aim has been evaluated and described along with how it was achieved. Within the constraints of the data collected the framework, questionnaires, observations and interviews were used to solve the following aims:

1. Understand the hazards and risks which were present at both Coes Ford and Chamberlains Ford

In order to understand the hazards and risks which were present at both sites, observations, interviews and questionnaires were used to help identify and understand the two sites. These hazards identified included flooding, water quality, extreme storms and fire events. These hazards were assessed, along with an understanding of where the communities' assets were located. A risk evaluation was then undertaken and the possible effects recorded. Planning for these events was then easier to achieve when all the previous knowledge was recorded. However, this process needed to be continually monitored and updated.

2. Understand how these hazards and risks were communicated through their various means

Communication of the hazards present at both research sites was also evaluated and the various communication methods were assessed. Interviews, observations and questionnaires provided insight into the ways they were recorded.

3. Based on the research, development of a framework improves assessment and communication of risk in transient at Coes Ford and Chamberlains Ford and similar sites.

The framework developed has shown the vulnerability of transient communities. As the data have shown, both Coes Ford and Chamberlains Ford have a different community make up, suggesting that each transient community needed to be assessed individually. The framework provided allowed for the information to be gathered to show this difference.

With many of the visitors at both sites from international countries an easier way to inform and advise people was needed to help ensure public safety. Planning plays a major part in risk reduction and this has begun to 'take off' in recent years, with the use of incorporating resilience in to hazard management. Within Christchurch itself, disaster management and risk reduction has been used to

help both prevent more destruction as well as improving resilience. Inbuilt resilience will help with protection in the future. By thinking about problems and how they can be solved before they arise can significantly reduce the impacts of disasters. Resilience was needed to be built within communities as this can help in preventing disasters.

6.1 Recommendations for Future Research

As a result of this research, further research on the topics below would be beneficial.

During the observation periods, cell phone reception was noted to be patchy at both locations. To the extent to which cell phones might be relied upon in an emergency (e.g. to call Selwyn DC or 111) further research needed to be undertaken on the adequacy of coverage on the campsites. This could also affect the ability to communicate with travellers who lacked other means of accessing the internet.

As highlighted above, the questionnaires revealed that half the people did not know what hazards were present at each site. Therefore, further research on this would be beneficial, especially by looking at other sites around the Selwyn District. Research that might shed light on both issues at Coes Ford and Chamberlains Ford and on broader issues could be very beneficial for the community. For example, how did these findings raise questions for the management of freedom campers or transitional communities in other parts of Selwyn or, indeed, other parts of the country?

As mentioned above, the questionnaires revealed that half of the people at Coes Ford and Chamberlains Ford did not know what hazards were present at each site. Is this similar at other camp sites around the Selwyn District?

Was the potential of algal bloom poisoning not as obvious and, therefore, not of as much concern as a potential tsunami might be for those camping by beaches?

6.2 Overall findings

Overall, the framework, questionnaires, observations and interviews have indicated the differences in the use and the communities at Coes Ford and Chamberlains Ford. The difference in these communities was important as it showed the variance between two sites that are located near each other. These conclusions communicated that the awareness of hazards in transient communities changes and there was a need to be aware that not all communities were homogeneous; each transient community was different and this has been reflected in the findings of this research.

Appendix list

A. Questionnaire

B. Research Statement

C. Set of Questions for Interviews

D. Chamberlains Ford Survey Sheet

E. Coes Ford Survey Sheet

F. Chamberlains Ford Questionnaire Data

G. Coes Ford Questionnaire Data

H. Weekly Data Observations Coes Ford

I. Weekly Data Observations Chamberlains Ford

J. Observational Visit Timetable

K. Raw Data from the Chamberlains Ford Visits

L. Raw Data from the Coes Ford Visits

M. Script for Questionnaires

Appendix A Questionnaire

Department of Environmental Management
Faculty of Environment, Society and Design

T 64 3 325 2811 • DDI 64 3 423 0437 PO Box 85084, Lincoln University
Lincoln 7647, Christchurch, New Zealand

www.lincoln.ac.nz

QUESTIONNAIRE

Name of Project: **Transient vulnerability in rural transient camping places.**

If you are 18 years old or older, you are invited to participate in this project by completing the following questionnaire.

The aim of the project is *to*: Evaluate the risk of hazards and how these are communicated to travellers at transient communities, Coes Ford and Chamberlains Ford

Please ask for a copy of the Research Intention Statement

This questionnaire is anonymous, and you will not be identified as a respondent. By completing this questionnaire, it is understood that you are giving consent to be involved in this research and consent to the publication of the results of the project with the understanding that your anonymity will be preserved. However you may at any time withdraw your participation, including withdrawal of any information you have provided before completing this questionnaire. All information provided will be destroyed.

Transient vulnerability in rural transient camping places.

Question #1

What is your age?

- ○ 18 to 24
- ○ 25 to 34
- ○ 35 to 44
- ○ 45 to 54
- ○ 55 to 64
- ○ 65 to 74
- ○ 74 or older

Question #2

Where did you receive this questionnaire?

- ○ Coes Ford
- ○ Chamberlains Ford

Question #3

What is your gender?

- ○ Female
- ○ Male

Question #4

Who are you here with?

- ○ Family
- ○ Partner
- ○ Friends
- ○ Myself
- ○ Other

Question #5

What is your ethnicity? (Please select all that apply.)

- ○ Asian (Please specify)
- ○ European(Please specify)
- ○ Maori Pacific Islander (please specify)
- ○ New Zealand European
- ○ Other (please specify)

Other (please specify)

Question #6

In what country are you usually resident?

If New Zealand, what province?

Question #7

In what languages are you? (please specify)

Fluent _____

Able to read newspapers_____

Able to understand oral news broadcasts_____

Question #8

How long have you been staying at this location?

- ○ 1 day (overnight)
- ○ 2 days
- ○ 3- 5 days
- ○ 6 +

Question #9

How many more days do you intend to stay at this location?

- ○ 1 day
- ○ 2 days
- ○ 3- 5 days
- ○ 6 +

Question #10

What is the purpose of your stay at this location?

Question #11

Is this location your?

- ○ Destination
- ○ Stop over
- ○ Day trip

Question #12

Where did you hear about this location?

Question #13

Is this your first visit?

- ○ Yes
- ○ No

Question #14

How long ago did you hear about this location?

Question #15

How often do you travel to this location?

- ○ Frequently
- ○ Occasionally
- ○ Never before

Question #16

How well would you rate your awareness of the following potential hazards at this Ford?

	Never thought of it	Thought of it	Aware they occur and know how to find out if one is likely	Know the probability of occurrence and check relevant sources for update daily
Floods	○	○	○	○
Fire	○	○	○	○
Extreme Storms	○	○	○	○
Water Quality	○	○	○	○

Question #17

Are there any other hazards that we have not covered in the above that you are aware of at this Ford.

Question #18

For those questions where you indicated you were aware of the hazards. Where did you find out this information?

Question #19

Have you at any point during your stay thought about the natural hazards (such as fire, flooding or water quality issues) present at this site, if so what impact has it had on your stay?

Major Impact	High Impact	Moderate Impact	Low Impact	No Impact
○	○	○	○	○

Question #20

To what extent have these hazards affected your enjoyment at this location?

Major Impact	High Impact	Moderate Impact	Low Impact	No Impact
○	○	○	○	○

Question #21

To what extent would they affect whether you return or not?

Major Impact	High Impact	Moderate Impact	Low Impact	No Impact
○	○	○	○	○

Question #22

Have any of the hazards in question #19 above been discussed with other visitors to this Ford?

- ○ Yes
- ○ No

If Yes which?

Question #23

What assets do you have present at this location that could be affected by natural hazards (such as fire, flooding or water quality issues)?

- ○ Tents
- ○ Car
- ○ Motorhome
- ○ Boat
- ○ Motorbike
- ○ Other (please specify)

Question #24

Do you think there are ways in which the hazards could be better communicated?

Question #25

Are the amenities satisfactory?

- ○ Yes
- ○ No
- ○ Undecided

Question #26

How might these be improved?

Question #27

Are you likely to return to this location?

- ○ Yes
- ○ No

Question #28

Do you stay in tune with the internet or use apps whilst staying at this Ford?

- ○ Yes
- ○ No

Question #29

Do you listen to the radio whilst camping?

- ○ All the time
- ○ Sometimes
- ○ Never

If so what channels?

Question #30

Did you come directly from this point or visit places on the route (if so which)?

- ○ Directly
- ○ Visited other places

Places visited?

Question #31

What is your purpose whilst you stay?

- ○ Stopover
- ○ Camping
- ○ Fishing
- ○ Recreational
- ○ Other (please specify)

Question #32

There are five nearby settlements, have you visited or shopped at any of them? If so how much did you spend on these items groceries, cafes and petrol?

	N/A	$1-$49	$50-$99	$100-$149	$150-$199	$200+
Leeston	☐	☐	☐	☐	☐	☐
Lincoln	☐	☐	☐	☐	☐	☐
Rolleston	☐	☐	☐	☐	☐	☐
Tai Tapu	☐	☐	☐	☐	☐	☐
Springston	☐	☐	☐	☐	☐	☐

Other (please specify both approx amount and location)

Thank you for participating in this study.

A study undertaken by Lincoln University.
For the purpose of gathering information for Master of Planning, Dissertation

Henry Winchester
henry.winchester@lincolnuni.ac.nz
0220874630

Supervisor Dr. Hamish Rennie
Professor & Director of Planning Programmes
hamish.rennie@lincolnuni.ac.nz
+64 3 42-30437

Appendix B Research Information Sheet

Department of Environmental Management Faculty
of Environment, Society and Design

T 64 3 325 2811 • DDI 64 3 423 0437 PO Box 85084, Lincoln University
Lincoln 7647, Christchurch, New Zealand

www.lincoln.ac.nz

23rd June 2016

RESEARCH INFORMATION SHEET

You are invited to participate as a subject in a project entitled: **Camping vulnerability in rural camping places.** The aim of this project is: To evaluate the risk of hazards and how these are communicated in transient communities at Coes Ford and Chamberlains Ford. Camping communities include travellers, short and long term campers, and people who visit for less than a day. The data will also help provide a baseline for future similar surveys to establish how effective are different ways of communicating natural hazard information and also to gain an understanding of trends in different users of the Fords and the potential human and economic losses that particular hazard events might cause.

Your participation in this project is voluntary and will involve:
Answering a series of questions in a questionnaire about your experience at this Ford and the reasons as to why you have chosen to visit this location and the ways in which you have learnt about various hazards at the Ford. Some information about you will also be collected to enable me to see how your experiences compare with other similar people. It will take approximately 20 minutes.

This is a student lead research project. The benefits of the research will help towards ensuring effective communication of natural hazards in transient communities. The research is being undertaken for Lincoln University is aimed at

If while answering the questions you feel at all stressed by questions or matters being raised you may decide not to continue or to take a break or skip those particular questions. If you wish to withdraw all information received will be destroyed.

The results of the project may be published, but your anonymity will be protected. In this investigation, and your identity is not required, it will not be made public or disclosed in any way to any person. To ensure anonymity your name and your vehicle registration will **not** be requested or recorded.

The project is being carried out by:
Henry Winchester (022-0874-630)
henry.winchester@lincolnuni.ac.nz

He will be pleased to discuss any concerns you have about participation in the project.
Supervisor is:
Dr. Hamish Rennie Associate Professor & Director of Planning Programmes (phone 03 423 0437)
Hamish.rennie@lincoln.ac.nz

The project has been reviewed and approved by the Lincoln University Human Ethics Committee.

Appendix C Interview Questions

New Zealand Fire Service

What is the response time for fire in the Selwyn District?

What are the main call outs during the summer period?

What is the communication like between Environment Canterbury and Selwyn District regarding natural disasters and how is the Fire Service involved?

Do you see the visitors and campers at places like Coes Ford and Chamberlains Ford as particularly problematic (e.g. in terms of potential to cause an event problem and also in terms of being vulnerable to an event)?

Is the vulnerability of the people at the fords different from that of local farmers? If so, how and why?

Has the brigade ever been called out to Coes or Chamberlains Fords? If so, how often does this usually occur on average during a year? Do you have any records or reports I could access/copy?

Do you have any general reflections on these call outs?

How they went, any particular issues or problems?

What are the perceived natural hazard risks at Coes Ford and Chamberlains Ford?

How significant are these events likely to be?

Do you have any written reports on flood events and their management at the two fords?

How frequent do you think flood events occur?

In relation to water quality, which site do you perceive as the most potentially significant in terms of impact on people using the fords?

How often during the summer period is an ECAN representative working in the community to inform the public of the potential health risks caused by water quality?

What is the process for managing naturally occurring high impact events such as floods, and toxic alga outbreaks in the Selwyn Catchment?

What are the main issues in communicating a warning to people of hazards generally at these locations? And of warning them when a particular event (e.g. a flood) is imminent or occurring (e.g. toxic algae)?

What could be done to **better** forewarn visitors to the Fords of potential Hazards?

How might management **better** respond during actual hazard events?

Appendix D Chamberlains Ford Survey Sheet

Dissertation Project Personal Check List

Chamberlains Ford AM PM	Number of Vehicles and Type
Bus	
Car	
Bike	
Motor Bike	
Motor Home	
Van	
Truck	

Size of Tents	
Large	
Medium	
Small	

Size of Vehicle	
Large	
Medium	
Small	

Location of People

Appendix E Coes Ford Survey Sheet

Dissertation Project Personal Check List

Coes Ford AM PM	Number of Vehicles and Type
Bus	
Car	
Bike	
Motor Bike	
Motor Home	
Van	
Truck	

Size of Tents	
Large	
Medium	
Small	

Size of Vehicle	
Large	
Medium	
Small	

Location of People

Appendix F Chamberlains Ford Questionnaire Data

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31
4	2	2	2	4	4	4	2	1	1	3	4	4	4	5	5	5	2	3	1	1	1	1	1	5	4	1	4	1	4	1
2	2	1	2	2	1	1	2	1	3	1	1	1	1	4	5	4	1	3	3	2	2	2	1	2	1	1	1	1	1	1
2	2	2	2	5	1	1	2	1	3	1	1	1	1	5	5	5	2	3	3	1	1	2	1	1	1	1	1	1	1	1
2	2	1	2	5	1	1	2	1	3	1	1	1	1	1	1	1	2	3	2	1	1	3	1	1	1	1	1	1	1	1
6	2	2	4	4	4	2	1	2	2	2	3	3	3	2	4	3	2	3	1	1	2	2	2	4	1	3	1	1	1	1
6	2	2	4	4	3	1	2	2	2	3	3	3	4	1	1	5	1	3	1	1	1	1	2	1	3	2	1	1	2	1
1	2	2	4	2	2	1	1	3	3	1	1	1	1	5	5	5	2	2	1	1	1	3	1	2	1	1	2	1	1	1
3	2	2	1	4	1	4	1	1	3	1	1	1	1	5	5	3	2	2	3	1	1	1	2	2	1	1	1	1	1	1
1	2	2	1	4	1	4	1	1	3	1	1	1	1	5	5	3	2	2	3	1	1	2	2	5	3	1	3	1	2	1
1	2	2	3	4	1	1	1	1	3	1	2	3	3	4	5	5	2	2	1	1	1	2	1	2	1	1	2	1	1	1
1	2	2	3	4	1	1	1	2	2	4	2	3	4	4	5	4	2	2	1	1	1	1	1	4	1	3	2	1	1	1
4	2	2	4	4	4	4	2	2	1	3	2	2	2	4	5	4	1	3	1	1	1	2	1	5	1	3	1	1	1	1
6	2	2	1	4	4	3	2	2	2	3	4	4	4	5	5	2	2	3	1	1	1	3	2	1	2	6	6	1	2	1
6	2	1	1	4	4	3	2	2	2	2	2	2	2	4	5	4	2	3	1	1	1	3	2	4	1	5	4	1	1	1
1	2	2	3	5	1	3	2	1	3	1	1	1	1	5	5	5	2	1	1	1	2	3	2	1	1	2	2	1	1	1
1	2	2	3	5	1	3	2	1	3	1	1	1	1	5	5	5	2	1	1	1	1	3	2	1	1	2	2	1	1	1
2	2	1	2	2	1	1	2	2	2	1	1	2	3	4	5	4	2	2	1	2	1	3	2	1	1	1	1	1	1	1
2	2	2	2	2	1	1	2	2	3	1	2	1	3	5	5	5	2	2	1	2	1	3	2	1	1	1	1	1	1	1
3	2	2	4	4	3	4	2	1	1	3	3	3	3	3	4	5	1	3	1	1	1	2	1	4	1	1	1	1	1	1
2	2	2	3	2	1	1	3	1	3	1	1	1	1	3	3	4	2	2	1	1	1	2	1	2	1	1	1	1	1	1
2	2	2	3	2	1	1	3	1	2	1	1	1	1	2	2	2	2	3	1	1	1	2	2	2	2	1	2	2	2	1
2	2	2	2	2	3	3	2	1	3	2	1	3	2	3	3	2	2	2	1	2	2	2	1	1	1	1	1	1	1	1
2	2	1	2	2	3	1	2	1	3	3	1	2	1	3	5	3	2	2	1	1	2	3	1	2	1	1	1	1	1	1
5	2	1	1	2	1	1	2	1	3	3	3	3	3	4	5	5	2	3	1	1	1	2	2	1	1	1	1	1	1	6
2	2	2	1	2	1	1	2	1	3	3	3	3	3	4	4	4	2	3	1	1	1	2	2	1	1	1	1	1	1	3
1	2	1	1	2	1	1	2	1	3	3	3	3	3	4	5	4	2	3	1	1	1	2	2	1	1	1	1	1	1	2
2	2	2	3	2	4	3	1	2	3	3	1	1	4	4	5	5	2	2	1	1	1	3	1	2	1	1	1	1	1	3
2	2	1	3	2	4	3	1	2	3	3	1	1	2	4	5	5	2	2	1	1	1	3	1	2	1	1	1	1	1	3
3	2	1	1	2	3	3	1	2	1	3	4	4	4	4	5	5	1	1	1	1	2	3	1	4	1	2	2	1	1	1
1	2	1	1	2	2	1	1	2	1	2	3	3	4	2	4	4	2	2	1	1	1	2	1	2	1	3	1	1	1	1
3	2	2	1	4	1	1	2	1	3	3	2	4	3	5	5	5	2	3	1	1	1	1	2	1	1	1	1	1	1	1
4	2	2	3	4	4	4	2	2	2	3	2	4	2	5	5	5	1	3	1	1	1	2	1	1	2	2	3	1	2	1
1	2	1	3	2	1	3	2	1	3	1	1	1	1	5	5	2	2	2	1	1	1	2	1	1	1	1	1	1	1	3
1	2	1	3	2	1	1	2	1	3	1	1	1	1	5	5	2	2	3	1	1	1	2	2	1	1	1	1	1	1	1
2	2	2	2	2	1	1	2	1	3	1	1	1	1	4	5	5	2	3	3	2	2	3	1	1	1	1	1	1	1	1
5	2	1	4	4	3	1	2	1	3	2	1	1	1	5	5	5	1	3	1	1	2	1	2	1	1	1	3	1	1	3
1	2	1	4	2	1	1	3	2	2	2	1	1	1	5	5	5	2	3	1	1	1	3	2	2	1	1	1	1	1	1
2	2	1	2	2	1	1	2	1	3	3	1	2	1	4	5	5	2	3	3	2	2	3	1	1	1	1	1	1	1	1
2	2	2	2	2	3	3	2	1	3	2	2	2	2	4	4	5	2	2	1	1	1	2	2	1	1	2	2	1	1	1
2	2	1	2	2	1	3	2	1	3	1	1	1	1	4	4	4	2	2	1	1	1	3	2	2	1	2	2	1	1	1

Appendix G Coes Ford Questionnaire Data

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22	Q23	Q24	Q25	Q26	Q27	Q28	Q29	Q30	Q31
4	1	2	3	4	4	4	2	2	2	3	3	3	1	3	4	1	2	2	1	1	2	2	2	2	4	1	1	3	1	1
4	1	2	3	2	4	4	2	1	3	3	3	3	3	4	4	5	1	2	1	2	1	2	2	1	3	3	2	1	1	1
1	1	2	4	5	1	1	3	1	3	2	1	1	2	5	5	4	2	2	1	1	1	1	1	1	1	1	1	1	1	1
2	1	2	2	2	4	1	1	2	2	2	2	1	3	5	5	5	2	3	3	1	2	2	2	2	2	6	4	2	3	1
1	1	2	3	2	3	2	2	2	2	3	3	2	3	3	4	4	2	2	1	1	1	2	2	1	1	5	6	1	1	1
1	1	2	4	2	2	2	2	2	2	2	1	1	1	5	5	5	2	2	3	2	1	3	1	1	1	2	2	1	1	1
6	1	2	4	4	3	4	2	2	1	3	3	2	4	3	4	3	1	2	1	1	1	1	2	5	3	5	2	2	1	1
2	1	1	2	2	1	1	2	1	3	4	3	1	2	4	5	4	2	2	1	1	1	3	1	2	1	1	1	1	1	1
2	1	2	1	2	1	1	2	1	3	4	3	2	4	3	5	5	2	3	1	1	2	3	2	2	1	1	1	1	1	1
2	1	2	3	2	4	4	2	1	2	3	2	2	2	4	5	4	1	2	1	1	1	2	1	2	1	6	2	1	1	1
1	1	2	3	2	4	3	2	1	1	2	2	2	2	4	5	4	2	2	1	1	1	2	1	1	1	4	4	1	1	1
1	1	2	3	4	1	2	1	1	3	3	2	3	3	3	5	4	2	2	3	1	1	1	1	2	1	1	1	1	1	1
2	1	2	4	2	2	1	2	2	3	2	2	1	2	5	5	5	2	3	1	2	2	3	1	1	1	1	1	1	1	1
1	1	2	3	2	2	4	1	1	3	1	1	1	3	4	5	5	2	2	1	1	1	2	1	2	2	2	2	1	2	1
1	1	2	3	2	2	2	2	1	3	1	1	1	1	5	5	5	2	2	1	1	1	2	1	2	1	3	1	1	1	1
1	1	2	3	3	1	2	1	1	3	2	2	1	2	4	5	4	2	2	3	1	1	1	1	2	1	1	1	1	1	1
2	1	2	2	5	2	3	1	1	3	1	1	1	1	5	5	5	2	2	1	1	1	3	1	2	1	1	1	1	1	1
1	1	1	3	2	4	3	2	2	1	1	1	1	2	5	5	5	2	2	1	1	2	3	2	1	1	2	3	1	1	1
1	1	2	3	2	4	4	2	2	2	2	1	1	2	5	5	5	2	2	3	1	1	3	1	1	3	5	5	1	1	1
2	1	2	2	2	1	1	2	1	3	1	1	1	1	5	5	5	2	2	3	1	1	3	2	1	1	1	2	1	1	1
2	1	1	1	2	2	3	2	2	1	1	1	1	1	5	5	5	2	3	3	1	2	3	1	1	1	2	2	3	1	1
2	1	1	2	2	1	1	2	1	3	1	1	1	1	5	5	5	2	2	3	1	1	3	2	1	1	1	2	1	1	1
1	1	1	1	1	3	1	2	1	3	3	3	3	1	4	5	5	2	3	1	1	1	3	2	1	1	2	1	1	1	1
2	1	1	3	2	1	1	2	1	3	1	1	2	2	4	2	3	2	2	3	1	1	2	1	1	1	2	1	1	1	1
1	1	2	3	2	4	1	2	2	2	1	1	2	2	5	5	5	1	2	3	1	1	3	2	1	1	2	1	1	1	1
4	1	2	1	1	3	1	2	1	3	1	1	2	2	5	5	5	2	3	1	1	1	3	2	1	1	1	1	1	1	1
2	1	2	2	2	2	1	2	1	3	1	1	1	1	3	5	5	2	2	1	1	1	3	2	2	1	2	1	1	1	4
2	1	1	2	2	2	1	2	1	3	1	1	1	1	3	5	5	2	3	1	2	1	3	1	2	1	2	1	1	1	4
2	1	2	4	4	1	1	2	1	3	2	1	2	3	5	5	5	2	2	1	1	1	3	2	1	1	1	1	1	1	1
1	1	1	2	2	1	3	2	2	2	2	1	2	2	1	5	5	1	2	3	2	2	3	1	2	1	1	1	1	1	1
2	1	1	2	2	1	3	2	2	2	3	2	1	3	4	5	5	2	2	1	1	2	3	1	1	1	2	1	1	1	1
1	1	2	2	2	1	3	2	2	2	3	2	1	3	4	5	5	2	2	1	1	1	3	1	1	1	2	1	1	1	1
2	1	2	4	2	3	3	2	2	2	3	2	1	3	3	4	4	1	2	3	1	1	3	2	4	1	4	3	1	1	1
1	1	1	1	2	1	1	2	1	3	4	3	3	3	3	5	4	2	3	1	2	2	3	1	1	1	1	1	1	1	1
1	1	1	1	2	1	1	2	1	3	2	1	2	1	3	5	4	2	3	1	1	2	3	1	1	1	1	1	1	1	1
1	1	1	2	2	1	1	2	1	3	3	3	3	3	5	5	4	2	2	1	1	1	3	1	1	1	1	1	1	1	1
1	1	2	2	2	1	1	2	1	3	3	3	3	3	5	5	4	2	2	1	1	1	3	1	1	1	1	1	1	1	1
2	1	2	2	2	1	1	2	2	1	3	1	1	2	2	5	4	2	2	3	1	1	1	3	1	1	1	1	1	1	1
2	1	1	2	2	2	1	2	1	3	1	1	1	2	4	4	5	2	3	1	1	1	3	1	1	1	1	1	1	1	1

2	1	2	2	2	1	1	2	1	3	2	2	2	1	4	5	3	2	2	1	1	2	3	2	1	1	1	1	1	2
2	1	1	2	2	1	1	2	1	3	2	2	2	2	3	5	3	2	2	1	1	1	2	2	1	1	1	1	1	2
1	1	2	3	2	1	1	2	1	3	1	1	2	3	4	5	5	2	2	3	2	1	2	2	1	2	2	1	1	1
1	1	3	2	1	1	2	1	1	3	1	1	1	1	5	5	5	2	2	3	1	2	2	2	2	1	2	1	1	2	1
1	2	3	2	1	1	1	2	1	3	1	3	3	2	5	5	5	2	2	3	2	2	3	2	2	1	1	1	1	1	1
1	1	2	3	2	1	1	2	1	3	1	1	1	1	5	5	2	2	2	1	1	1	3	2	1	1	2	2	1	1	1
2	1	2	2	2	1	1	2	1	3	2	3	1	2	4	5	5	2	2	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	2	1	1	1	1	3	2	3	1	2	4	5	5	2	2	1	1	1	1	1	1	1	1	1	1	1	1
2	1	1	2	5	4	3	2	2	2	3	1	3	3	4	3	4	1	2	1	1	2	2	2	2	1	5	6	1	1	1
2	1	2	2	2	1	1	2	1	3	3	1	2	2	5	5	5	2	2	3	1	1	2	2	2	1	1	1	1	1	1
2	1	2	2	5	4	3	2	2	2	3	1	3	3	4	4	3	2	2	1	1	2	3	2	1	1	3	3	1	1	1
1	1	1	2	2	1	1	2	1	3	4	2	2	1	3	4	5	2	2	3	1	1	3	2	2	1	1	1	1	1	3
2	1	2	2	2	1	1	2	2	2	2	2	2	2	4	5	4	2	3	1	1	2	3	1	1	1	1	1	1	1	1
2	1	1	2	2	1	1	2	2	2	3	3	2	2	5	5	5	2	3	1	1	1	3	1	1	1	1	1	1	1	1
5	1	2	4	2	1	1	1	2	2	4	4	4	2	5	5	5	2	2	1	1	2	1	1	1	1	1	1	1	1	1
1	1	1	4	2	1	1	2	2	2	2	1	1	2	4	4	3	2	2	3	1	1	3	2	2	1	2	1	1	1	1

For both sets of questionnaire data (Coes Ford and Chamberlains Ford), please see pen drive for what the row data represents

Appendix H Weekly Data Observations for Coes Ford

Totals	Week 1		
Number of Vehicles			**Percentage**
Bus		35	19%
Car		43	24
Bike		0	0
Motor Bike		0	0
Motor Home		34	19
Van		48	26.9
Truck		18	10
	Total	**178**	
Size of Tents/Campervan			
Large		40	60
Medium		21	30
Small		6	9
Total		**66**	
Size Vehicle			
Large		59	33
Medium		52	29
Small		67	37
Total		**178**	
Weather	**Overcast mainly**		
Totals	Week 2		
Number of Vehicles			**Percentage**
Bus		40	22%
Car		47	25.4
Bike		0	0

Motorbike		0	0
Motor Home		33	17.8
Van		38	20.5
Truck		27	14.5
		185	
Size of Tents/Campervan			
Large		18	40.9
Medium		20	45.4
Small		6	13.6
Totals		**44**	
Size Vehicle			
Large		57	30.8
Medium		60	32.4
Small		68	36.7
Total		**185**	
Weather	**Overcast and sunny**		
Totals	Week 3		
Number of Vehicles			**Percentage**
Bus		41	22%
Car		39	21
Bike		0	0
Motor Bike		0	0
Motor Home		30	16.2
Van		50	27
Truck		25	13
	Total	**185**	
Size of Tents/Campervans			
Large		14	32
Medium		21	48
Small		8	18
Total		**43**	

Size Vehicle			
Large		61	32
Medium		63	34
Small		61	32
Total		**185**	
Weather	**Sunny**		
Totals	Week 4		
Number of Vehicles			**Percentage**
Bus		34	19%
Car		24	13.4
Bike		0	0
Motor Bike		0	0
Motor Home		30	16.8
Van		54	30.3
Truck		36	20
	Total	**178**	
Size of Tents/Campervan			
Large		1	9
Medium		9	81.8
Small		1	9
Total		**11**	
Size Vehicle			
Large		61	34.2
Medium		59	33
Small		58	32.5
Total		**178**	
Weather	**Sunny**		

Totals	Week 5		
Number of Vehicles			**Percentage**
Bus		34	19%
Car		20	10.9
Bike		0	0
Motor Bike		0	0
Motor Home		28	15.3
Van		68	37.1
Truck		31	16.9
	Total	**183**	
Size of Tents/Campervan			
Large		0	15.3
Medium		4	37.1
Small		2	16.9
Total		**6**	
Size Vehicle			
Large		61	33.3
Medium		66	36
Small		56	30.6
Total		**183**	
Weather	Overcast rain		

Appendix I Weekly Data Observations for Chamberlains Ford

Totals	Week 1		
Number of Vehicles			**Percentage**
Bus		34	20%
Car		44	25.70%
Bike		3	1.7
Motor Bike		0	0
Motor Home		35	20
Van		25	14
Truck		30	17
	Total	**171**	
Size of Tents/Campervan			
Large		23	41
Medium		23	41
Small		9	16
Total		**55**	
Size Vehicle			
Large		62	36
Medium		45	26
Small		64	37
Total		**171**	
Weather	**Overcast**		
Totals	week 2		
Number of Vehicles			**Percentage**
Bus		31	21%
Car		42	27
Bike		7	4.6
Motor Bike		2	1.3
Motor Home		34	22.5

Van		13	8.6
Truck		22	14.5
	Total	**151**	
Size of Tents/Campervan			
Large		11	26.8
Medium		18	43.9
Small		12	29.2
Total		**41**	
Size Vehicle			
Large		50	33.1
Medium		35	23.1
Small		66	43.7
Total		**151**	
Weather	**Sunny/Overcast**		
Totals	Week 3		
Number of Vehicles			**Percentage**
Bus		32	18%
Car		44	25.7
Bike		16	9.3
Motor Bike		1	0.5
Motor Home		39	22.8
Van		14	8.1
Truck		25	14.6
	Total	**171**	
Size of Tents/Campervan			
Large		2	4.6
Medium		25	58
Small		16	37
Total		**43**	
Size Vehicle			

Large		59	34
Medium		39	22
Small		73	42
Total		**171**	
Weather	**Sunny/Overcast**		
Totals	Week 4		
Number of Vehicles			**Percentage**
Bus		46	26%
Car		52	29.3
Bike		12	6.7
Motor Bike		0	0
Motor Home		35	19.7
Van		15	8.4
Truck		17	9.6
Size of Tents/Campervan			
Large		35	19.7
Medium		15	8.4
Small		17	9.6
Total		**36**	
Size Vehicle			
Large		69	38.9
Medium		33	18.6
Small		66	37.2
Total			
Weather	**Sunny/Overcast**		
Totals	Week 5		

Number of Vehicles			Percentage
Bus		54	31%
Car		40	23.2
Bike		20	11.6
Motor Bike		0	0
Motor Home		28	16.2
Van		13	7.5
Truck		17	9.8
	Total	**172**	
Size of Tents/Campervan			
Large			0
Medium		14	63.6
Small		8	36
Total		**22**	
Size Vehicle			
Large		79	45.9
Medium		27	15.6
Small		66	38.3
Total		**172**	
Weather	**Overcast/Rain**		

Appendix J Timetable for Observational Visits at both Sites

	Monday		*Tuesday*		*Wednesday*		*Thursday*		*Friday*	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**	**AM**	**PM**
Coes Ford	*8:30am-9:00am*	*3:30pm - 4:00pm*	*8:30am - 9:00am*	*3:30pm - 4:00pm*	*8:30am - 9:00am*	*3:30pm - 4:00pm*	*8:30am - 9:00am*	*3:30pm-4:00pm*	*8:30am-9:00am*	*3:30pm - 4:00pm*
Chamberlains Ford	*9:10am-9:40am*	*4:10-4:40pm*	*9:10am - 9:40am*	*4:10-4:40pm*	*9:10am - 9:40am*	*4:10-4:40pm*	*9:10am - 9:40am*	*4:10-4:40pm*	*9:10am-9:40am*	*4:10-4:40pm*

Appendix K Raw Data from the Chamberlains Ford Visits

See attached pen drive

Appendix L Raw Data from the Coes Ford Visits

See attached pen drive

Appendix M Questionnaire Script

"Good morning/afternoon.

My name is Henry Winchester, and I'm currently studying at Lincoln University. I'm working towards my Masters of Planning and I'd like you to participate in my research project by answering a series of questions in a questionnaire. Your anonymity will be protected. Information that would identify you will not be recorded. Your participation is entirely voluntary and you may stop at any stage. This will take up to 20 minutes and you may withdraw any information up until you return the questionnaire to me. This research aims to evaluate the risks of natural hazards present here and how these are communicated to people using the area. I am also seeking information as to who uses the area to enable better targeting of information about risks. Some data on your expenditure will also help understand the potential losses to local economies if a disaster occurs. Your participation will be appreciated. If you wish to see more information I can provide you with a written research information statement and if you want time to consider whether you are willing to participate I can come back in ten minutes. Thank you for your time. Are you willing to participate now or would you like ten minutes to think about it and read the information sheet?"

References

Bentley, T. A., Page, S. J., & Macky, K. A. (2007). Adventure tourism and adventure sports injury: The New Zealand experience. *Applied Ergonomics, Volume 38, Issue 6*, 791–796.

Blaikie, P., Cannon, T., Davis, I., & Wisner, B. (2014). *At risk: natural hazards, people's vulnerability and disasters.* Routledge.

Callinan, N., Cottam, R., Cranston, L., Shields, E., & Wurzer, C. (2016). *Natural Hazards Planning in New Zealand.* Lincoln: Lincoln University.

Civil Defence Emergency Management Act 2002. No 33. (n.d.). Retrieved August 2016, from New Zealand Legislation: http://www.legislation.govt.nz/act/public/2002/0033/latest/whole.html#DLM149795

Cottam, R., Shields, E., Cranston, L., Callinan, N., & Wurzer, C. (2016, May 27th). A Critical Appraisal of an NPS on Natural Hazards. Lincoln University.

Cutter, S. L., Ahearn, J. A., Amadei, B., Crawford, P., Eide, E. A., Galloway, G. E., . . . Zoback, M. (2013). Disaster Resilience: A National Imperative. *Environment: Science and Policy for Sustainable Development 55:2*, 25-29.

Cutter, S. L., Boruff, B. J., & Shirley, L. W. (2003). Social Vulnerability to Environmental Hazards. *Social Science Quarterly, 84*, 242–261.

Eisenman, D. P., Cordasco, K. M., Asch, S., Golden, J. F., & Glik, D. (2007). Disaster Planning and Risk Communication With Vulnerable Communities: Lessons From Hurricane Katrina. *American Journal of Public Health, Vol. 97*, S109-S115.

Eiser, R. J., Bostrom, A., Burton, I., Johnston, D. M., McClure, J., Paton, D., . . . White, M. P. ((2012)). Risk interpretation and action: conceptual framework for responses to natural hazards. *International Journal of Disaster Risk Reduction*, 5-16.

Environment Canterbury. (2016, September). *Recreational Water Quality*. Retrieved from Environment Canterbury: http://maps.ecan.govt.nz/WaterQuality/#

Far North District Council. (2016). *Using hapū and iwi environmental management plans in our work.* Kaikohe: Far North District Council.

Flick, U. (2011). *Introducing Research Methodology.* London, Thousand Oaks, New Delhi,Singapore: SAGE Publications Ltd.

Gaudard, L., & Romerio, F. (2015). Natural hazrad risk in the case of an emergency: the real options approach. *National Hazards*, 473-488.

GNS Science. (2009). *Risk Management Process*. Retrieved September 2016, from GNS Science: http://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox/Setting-the-Scene/General-Natural-Hazard-Guidance/Risk-Management-Process

GNS Science. (2016). *Risk based planning approach and steps*. Retrieved September 2016, from GNS Science: http://www.gns.cri.nz/Home/RBP/Risk-based-planning/A-toolbox/Risk-based-planning-approach-and-steps

Gregory , J. (2013). *Central government rewrites relationship with local government.* Retrieved July 2016, from Chapman-Tripp: http://www.chapmantripp.com/publications/Pages/Central-government-rewrites-relationship-with-local-government.aspx

Joseph, J. (2013). Measuring vulnerability to natural hazards:a macro framework. *Disasters*, Volume 37, Issue 2,185-200.

Lein, H. (2009). The Poorest and most vulnerbale? On hazards, livelihoods and labelling of riverine communities in Bangladesh. *Singapore Journal of Tropical Geography*, Volume 30, issue 1,98-113.

Local Government Act 2002. (n.d.). Retrieved from New Zealand Legislation: http://www.legislation.govt.nz/act/public/2002/0084/latest/whole.html?search=sw_096be8ed8128f030_camping_25_se&p=1#DLM170876

Local Government New Zealand. (October 2014). *Managing natural hazard risk in New Zealand - towards more resilient communities.* Wellington: LGNZ.

Makridakis, S., & Taleb, N. (2009). Decision making and planning under low levels of predictability. *International Journal of Forcasting*, 716-733.

Ministry for the Environment. (2016). *Managing natural hazards in New Zealand*. Retrieved August 2016, from Ministry for the Environment: http://www.mfe.govt.nz/more/natural-hazard-management/managing-natural-hazards

Ministry of Civil Defence. (1990). *Civil Defence in New Zealand.* Retrieved August 2016, from Civil Defence: http://www.civildefence.govt.nz/assets/Uploads/publications/Short-History-of-Civil-Defence.pdf

Morrow, B. H. (1999). Identifying and Mapping Community Vulnerability. *Disasters*, Volume 23, Issue 1, 1-18.

New Zealand Government. (1991). Resource Management Act. Wellington.

Nieland, C., & Mushtaq, S. ((2015)). The effectiveness and need for flash flood warning systems in regional inland city in Australia. *National Hazards*, 153-171.

NIWA. (2013, January 16). *Riskscape*. Retrieved August 2016, from NIWA: http://www.niwa.co.nz/natural-hazards/research-projects/riskscape

NIWA. (2016, Ocotber 20). *How it works*. Retrieved August 2016, from Riskscape: https://riskscape.niwa.co.nz/how-it-works

NIWA, GNS Science. (2015, December). *The Riskscape Process*. Retrieved August 2016, from Riskscape: http://www.wiki-riskscape.niwa.co.nz/index.php/The_Riskscape_Process

NZPI (New Zealand Planning Institute). (2016). *Improve the mangement of risks from natural hazrads.* Auckland: NZPI.

Paton, D., & Johnston, D. (2001). Disasters and communities: vulnerability, resilience and preparedness. *Disaster Prevention and Management: An International Joural*, Volume 10, Issue 4, 270-277.

Quality Planning. (2012). *Relationship between the Local Government Act 2002 and the Resource Management Act 1991.* Retrieved August 2016, from The RMA Quaility Planning Resource: http://www.qualityplanning.org.nz/index.php/related-laws/relationship-between-the-local-government-act-and-the-resource-management-act

Quinn, S. C. (2008). *Crisis and Emergency Risk Communication in a Pandemic: A model for building capacity and resilience of minority communities.* Lincoln : Lincoln University.

Reserves Act 1977.No 66. (n.d.). Retrieved August 2016, from Legislation New Zealand: http://www.legislation.govt.nz/act/public/1977/0066/latest/DLM444451.html

Reserves Act, No. 66. (1977). Retrieved from http://www.legislation.govt.nz/act/public/1977/0066/latest/DLM444305.html

Reynolds, B., & Seeger, M. W. (2005). Crisis and Emergency Risk Communication as an Intergrative Model. *Journal of Health Communication*, 43-55.

Saunders, W. S., & Beban, J. S. (2012). *Putting Risk in the RMA: Technical Advisory Group reccomendations on the Resource Management Act 1991 and implications for natural hazards planning.* Wellington: GNS Science Miscellaneous Series 48.

Saunders, W., Beban, J. G., & Grace, E. S. (2014). *Overview of the state of land use planning for natural hazards in New Zealand.* Lower Hutt, New Zealand: GNS Science.

Schrader, B. (2016, Feb 23). *City Planning*. Retrieved July 2016, from Te Ara - the Encyclopedia of New Zealand: http://www.teara.govt.nz/en/city-planning

Selwyn District Council. (2009). *Chamberlains Ford Recreation Reserve.* Rolleston: Selwyn District Council.

Selwyn District Council. (2009). *Coes Ford Recreation Reserve.* Rolleston: Selwyn District Council.

Standards Australia, & Standards New Zealand. (2009). *Risk management - Principles and guidelines.* Sydney, Wellington: Standards Australia, Standards New Zealand.

Swarbrick, N. (2016, Ocotber 10). *Story: Civil defence*. Retrieved July 2016, from Te Ara - the Encyclopedia of New Zealand: http://www.TeAra.govt.nz/en/civil-defence

Taubenbock, H., & Geib, C. (2014). Vulnerability and Resilience Research: A Critical Perspective. *International Journal Disaster Risk Science*, 86-87.

The RMA Quality Planning Resource. (2015). *Treating risks: an overview of RMA tools for managing natural hazards*. Retrieved July 2016, from The RMA Quaility Planning Resource: http://www.qualityplanning.org.nz/index.php/planning-tools/natural-hazards/overview-of-rma-tools-for-managing-natural-hazards

Town and Country Planning Act. No 121. (1977). Retrieved August 2016, from New Zealand Legal Information Institute: http://www.nzlii.org/nz/legis/hist_act/tacpa19771977n121320/

UNISDR. (2015). *Chart of the Sendai Framework for Disaster Risk Reduction.* UNISDR. Retrieved July 2016, from http://www.preventionweb.net/go/sfdrr

Wagner, C. H., & Zia, A. (2015). Mainstreaming Early Warning Systems in Development and Planning Processes: Multilevel Implementation of Sendai Framework in Indus and Sahel. *International Journal of Disaster Risk Science*, 189-199.

Wratt, D., & Mullan, B. (2016, November 2). *Climate change scenarios for New Zealand*. Retrieved from NIWA: https://www.niwa.co.nz/our-science/climate/information-and-resources/clivar/scenarios

Zahari, R. K., & Ariffin, R. N. ((2013)). Risk Communications: of Kuala Lumpur. *Procedia Environmental Sciences 17*, 880-888.